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Self-Activity, in the process of education there seem to be two principal factors. On the one hand are the instincts, impulses and interests of the individual, whether child or adult; and on the other hand are certain sensations and stimuli which operate from without. The name of *self-activity* is given to the native tendencies of the individual. These include instincts, impulses and interests. Every instinct, indeed, involves an impulse and tends to create an interest. The factor of self-activity in the process of education has been chiefly emphasized by the school of Froebel. By Froebel self-activity was regarded as the divinely set spark of the fire of life or the seed of all development. It was regarded as a datum of unity in the soul. However, it is a question whether one should speak of self-activity or only of *self-activities.* An analysis of self-activity would seem to involve something like the classification of instincts. Self-activity would then involve not only the natural physical tendencies but the inclination towards imitation, emulation, pugnacity, sympathy, hunting, fear, acquisitiveness, constructiveness, play, curiosity, sociability, shyness, secretiveness, cleanliness, shame and love. It seems absurb to regard these self-activities as reducible to a single type and equally absurd to regard them as wholly independent of one another. It follows that original self-activity is neither a mere unity nor a mere set of different activities, but rather a germ both of unity and of difference. This is important for the theory of the will. The will is partly given and partly achieved. The will, indeed, simply is the unity of self-activity. Self-activity, therefore, is encouraged in education, as the basis of will, effort and interest. It seems to be best developed by its own exercise. Such occupations as manual training, which involve doing rather than imitating, are therefore regarded as concessions to the doctrine of education by self-activity. Education by self-activity practically is education by development. The nature of the child is followed and not constrained. Yet it is clear that the child has to meet certain social demands. These demands are represented by the curriculum, which must be mastered. The curriculum itself can only to a limited extent cater to self-activity. It is method, therefore, rather than curriculum, which is founded upon a study of self-activity or upon child-study. Education according to self-activity emphasizes child-nature, individually, psychological method and the principles of heredity. In general, the treatment of self-activities in education should be sympathetic but not servile. The teacher is not to eliminate them, as if they represented original sin; but he is not to pander to them where duty demands a sacrifice. They are not to be destroyed, nor yet followed; they are to be guided and controlled.

Seligman (*sĕl′ĭg-măn*), **Edwin Robert Anderson,** an American economist and author, was born in New York in 1861. He was graduated at Columbia College in 1879. Seligman was appointed lecturer on political economy at Columbia in 1885, became adjunct professor in 1888, and in 1891 professor of political economy and finance. From 1902 until 1904 he was president of the American Economic Association. He held many advisory positions, including that of expert to the League of Nations commission on economics and finance in 1922 and 1923. Seligman early became identified with the periodicals of his day. In 1886 he established the *Political Science Quarterly,* of which he was an editor. He was also editor of the *Columbia Studies in History, Economics, and Public Law,* and the fifteen volume *Encyclopedia of the Social Sciences* (1930). He was a prolific writer on the various phases of economy. His more recent writings include: *The Economic Interpretation of History* (1902); *Principles of Economics* (1905, twelfth edition, 1929); *The Income Tax* (1911); *Studies in Public Finance* (1925), and *The Economics of Farm Relief* (1929).

Selim (*sē′lĭm*) **I,** a sultan of Turkey, was born in 1467. In 1512 he dethroned his father, Bajazet II, with the aid of the Janizaries, and put his father, brothers and nephews to death. In 1514, after massacring 40,000 Shîites (the followers of Ali), he declared war against Persia and defeated Shah Ismail near Tabriz. Three years later he wrested Egypt from the Mamelukes and annexed Syria. He also forced the caliph of Cairo to yield the headship of the Mohammedan world and the standard of the prophet. The sacred cities of Mecca and Medina also fell into his hands. This able yet savage ruler, however, improved the condition of the people he had conquered, kept the Janizaries in order, and laid the foundation for the modern Turkish military power. He was a lover of literature and a great patron of the arts. He died in 1520.

Seljuks (*sĕl-jo͞oks*), a division of the Ghuzz confederacy of Turkish tribes. Togrul Beg, a grandson of Seljuk, founder of the dynasty, crippled the empire of Ghazni (1040), conquered Persia and, ten years later, Bagdad. Togrul's nephew and successor, Alp-Arslan, wrested Syria and Palestine from the caliph of Egypt, and in 1071 captured Diogenes, the Byzantine emperor. Diogenes' ransom was the best part of Asia Minor. He was succeeded in 1072 by his son Malik Shah whose grand-vizier founded a university at Bagdad, and with Omar Khayyam revised the astronomical tables and introduced the Jelalian, a new era. Malik Shah established independent sovereignties in Asia Minor and Syria. The empire in 1092, at the close of this reign, began to break up into smaller kingdoms. Even before this, strong chieftains like Saladin had been really independent. In the thirteenth century the orders of *dervishes* arose, and the Mongols began to gain the power which they wielded over this part of Asia till the rise of the Ottoman princes, who, like the Seljuks, were Turks and had been driven westward by the Mongols.

Out of their supremacy grew the Turkish empire.

Selkirk, Alexander. See Juan Fernandez.

Selkirk Mountains, an outlying range of the Rocky Mountains, are situated in the southeastern part of British Columbia, reaching southward almost to the United States boundary. They are separated from the Rockies by the northwesterly flowing Columbia river, which also bounds them on the west in its southward course. The Selkirks extend over an area of 16,000 square miles of thoroughly alpine scenery. The highest peak is Mount Sir Donald, which rises to an altitude of 10,645 feet. The Canadian Pacific railway crosses the Selkirks through Roger's Pass, at an altitude of 4,300 feet. The range contains enormous glaciers. It is the home of bears, bighorned sheep and Rocky Mountain sheep.

Selma, a city and the seat of Dallas County, Alabama, is situated on the Alabama River, fifty miles from Montgomery. The city is in the fertile black belt section of the South where cotton and livestock are extensively produced. It is served by three railroads, and is located at the head of year-round steamboat navigation on the Alabama River. Among the most notable buildings of the city are the Carnegie Library, Dallas Academy, the Alabama Methodist University and Selma University, a Baptist institution for negro students. Among the principal industries are cotton factories, a cotton-warehouse, a cotton-seed-oil mill, car-wheel shops, iron-works, and railroad machine shops, and the manufacture of wagons, boxes, bricks and fertilizer. Selma was settled in 1756 and incorporated in 1826. During the Civil War the city was a Confederate supply depot, with a navy-yard, arsenal, powder-works and artillery-foundries. It was captured by the Union forces in 1865. The population is 18,012.

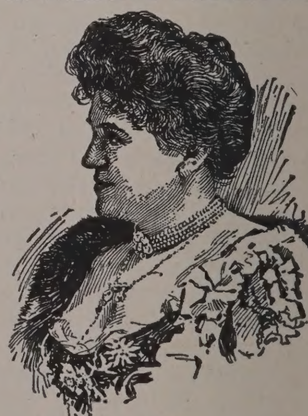
Selous (*sĕ-lōō'* or *sĕ-lōōs'*), **Frederick Courteney,** a British explorer and hunter, was born in London on December 31, 1851. He was educated at Rugby College in England, and in Switzerland and Germany. He left England for South Africa in July, 1871, went to Matabeleland the year after, and supported himself for nineteen following years by elephant-hunting and collecting natural history specimens. In 1890 he entered the British South Africa Company, and guided the pioneer expedition to Mashonaland. In 1892 he took part in the first Matabele war. He was awarded the Cuthbert Peek grant, the Back premium and the Founder's gold medal by the Royal Geographical Society, and was a corresponding member of the Zoölogical Society. During the World War, he served in East Africa. He received the Distinguished Service Order and was killed in action in 1917. Selous was the author of a number of volumes on adventure and exploration, including *A Hunter's Wanderings in Africa* (1881); *Sunshine and Storm in Rhodesia* (1896); *Recent Hunting Trips in British North America* (1907), and *African Nature Notes and Reminiscences* (1908).

Semaphore (*sĕm'ȧ-fōr*), a signal telegraph, such as the apparatus used on railroads for giving signals by means of oscillating arms, flags or lanterns, or the floating device displaying signals in a waterway to reveal the depth of water. The most common semaphore is the instrument with one or two movable arms at the head of a pole, which can be arranged in various positions to signify letters, numbers, or other meanings. The invention is said to be that of Chappe, a Frenchman, in 1794. In 1795 it was adopted by the British. The earliest semaphore towers had three pairs of arms, one above the other, manipulated from a room below. A mast with two arms, one above the other, superseded this.

By means of these signals, messages may be transmitted by spelling out the words or by code. Semaphore signals may be made by motions of a man's arms, with or without flags in the hands, using the arms in various positions in place of the mechanical arms of the instrument. The same code is used for human arms or for the instrument. Semaphore signals are used in the United States army and navy, with the same code. The hand semaphore is frequently used for short distances, the naval flags usually being a blue square with white center, and the army flags an orange square with a scarlet center or the reverse. At night, the simple machine is used with electric lamps mounted along the arms and bar. Often, the subsidiary meanings to certain displays are changed, and frequently the whole code is recast in time of war, by a cipher correction operated either under a fixed system or by arbitrary variation.

Semasiology (*sē-mā-sĭ-ŏl'ō-jĭ*), the science of meanings or significance of words and the development of their meanings. See Philology.

Sembrich (*zĕm'brĭk*), **Marcella,** whose real name was Praxede Marcelline Kochanska, an Austro-Polish opera-singer, was born at Lemberg in Galicia, on February 15, 1858. She first studied violin and piano, her master on the latter being Franz Liszt. One of her early teachers was Wilhelm Stengel, to whom she was later married. When her remarkable voice was discovered, she went to Milan to study with Lamperti. She made her debut in opera at Athens in *I Puritani* in 1877. Soon she became associated with the company of the Royal Opera House, Dresden, remaining with them until 1880. During that year she made her first appearance in London. She became a great favorite in the characters of Terlina, Susanna, Constance,



Marcella Sembrich

Martha and Lucia. She came to the United States in 1883, and has appeared here in several seasons of concert and opera work. She retired from active work on the stage in 1900, but continues to sing occasionally in concerts.

Semele (*sĕm'ē-lē*), in Greek story, was beloved by Zeus, and Hera, moved by jealousy, persuaded her to ask him to appear in all his majesty as king of gods and men. Having sworn to grant her every request and warned her in vain not to press her wish, he unwillingly yielded and appeared as the god of the thunderbolt. Semele was consumed by the lightning, but the child to which she was about to give birth was saved by Zeus. This child was Dionysus, the god of wine.

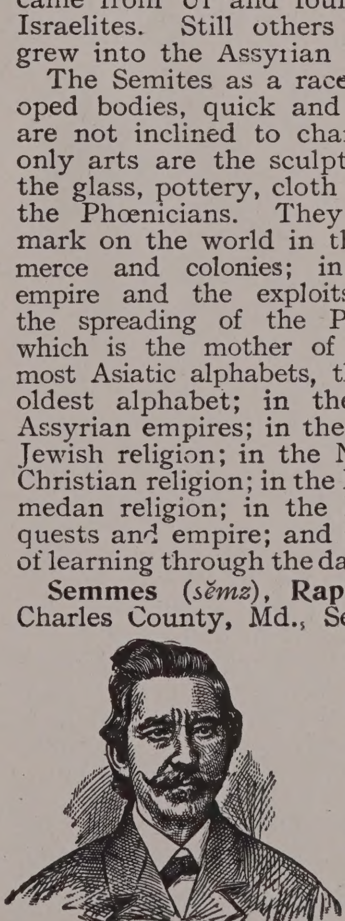
Seminoles (*sĕm'ĭ-nōlz*), at first a wandering branch of Creek Indians. In 1817 they joined the Creeks and some refugee negroes in ravaging the white settlements in Georgia, plundering the plantations and carrying off slaves whom they refused to surrender. Andrew Jackson was sent to punish them, and his expedition hastened the cession of Florida to the United States (1819). The Seminoles, numbering 4,000 in 1823, by a treaty made in that year sold most of their lands for a yearly sum. In 1832 a treaty for the removal of the whole tribe west of the Mississippi was signed by the chiefs, but the tribe, under the leadership of Osceola, would not ratify it. This led to a war lasting seven years and costing hundreds of lives and millions of dollars. At length the tribe was removed to Indian Territory (now Oklahoma), where are now settled all the Seminoles, some 3,000, except about 200 still lingering in Florida and a few in Texas. The Seminoles are steady, sober and industrious, and in the progress they have made rank next to the Cherokees, Creeks and Choctaws. They receive $25,000 a year, besides money to keep up their schools and government. They cultivate about 8,000 acres. They have eight churches, and are under the training of Presbyterian missionaries.

Semiramis (*sē-mĭr'ȧ-mĭs*), wife of Ninus, who, according to the Greek historians, founded Nineveh. A daughter of Derceto, the fish-goddess, she was exposed to death when a baby, but miraculously fed by doves and brought up by a shepherd. Onnes, one of the king's generals, charmed by her beauty, married her; but she won the heart of the king himself by her heroic capture of Bactra, whereupon her husband had the loyalty to take his own life. Ninus soon died, leaving Semiramis to reign gloriously for 42 years, conquering in Persia, Libya and Æthiopia, but failing in her attack on India, where her army was cut to pieces by elephants. She at last disappeared, according to some stories, in the form of a dove. The name of the mighty queen survived in the names of many great works, as the hanging-gardens of Babylon, which were attributed to her. The Semiramis of the North was the name aptly given to Catherine II of Russia.

Semites (*sĕm'ītes*), a name applied to a group of nations, much alike in language, religion, manners and looks, who are represented in *Genesis x* as descended from Shem, a son of Noah. Their home is Abyssinia, Arabia, Palestine, Phœnicia, Syria and the countries of the Euphrates and Tigris. It is generally believed that as early as 4000 B. C. the Semites migrated as wandering tribes, probably from Arabia, into Mesopotamia. There they found a people dwelling in cities built of brick, under a regular government of priest-kings, skilled in metals and using cuneiform (*q. v.*) writing. Accad, Shumir and Elam were conquered, the Semites forming the upper classes of society and ruling the Akkadians and Sumerians. Chedorlaomer, a king of Elam, about 2200 B. C. conquered as far as Palestine. Some Semites migrated northwestward and founded Tyre, Sidon and other cities on the Mediterranean, and became known as Canaanites and Phœnicians. Later, others came from Ur and founded the nation of Israelites. Still others built cities which grew into the Assyrian empire.

The Semites as a race have finely-developed bodies, quick and clever minds, but are not inclined to change. Almost their only arts are the sculpture of Assyria and the glass, pottery, cloth and embroidery of the Phœnicians. They have made their mark on the world in the Phœnician commerce and colonies; in the Carthaginian empire and the exploits of Hannibal; in the spreading of the Phœnician alphabet, which is the mother of the European and most Asiatic alphabets, though it is not the oldest alphabet; in the Babylonian and Assyrian empires; in the Hebrew Bible and Jewish religion; in the New Testament and Christian religion; in the Koran and Mohammedan religion; in the Mohammedan conquests and empire; and in the preservation of learning through the dark and middle ages.

Semmes (*sĕmz*), **Raphael,** was born in Charles County, Md., Sept. 27, 1809. He entered the navy in 1826, and became a commander in 1855. He served during the Mexican War as a naval officer and also as an aide to General Worth. As commander of the Confederate steamer *Sumter*, he ran the blockade at the mouth of the Mississippi at the beginning of the Civil War. After capturing several



RAPHAEL SEMMES

merchant-vessels in the Gulf of Mexico, he sailed to England. On leaving Southampton he was pursued by the Federal steamer *Tuscarora*, blockaded at Tangier, and forced to sell his ship. In August, 1862, he took command of the famous *Alabama*, built in England and manned by an English crew. He then commenced a successful cruise against merchant-vessels. He also sank the gunboat *Hatteras* off Galveston; but on June 19, 1864, the *Alabama* was herself sunk by the *Kearsarge* in a sea-fight off the harbor of Cherbourg, France. Semmes, however, escaped in an English yacht. He opened a law-office at Mobile after the war closed, but was arrested and suffered a four months' imprisonment. He afterwards wrote and lectured on his adventures during the war. Semmes died at Mobile, Ala., Aug. 30, 1877.

Sempach (*zĕm'päk*), **Battle of.** See WINKELRIED, ARNOLD VON.

Seneca (*sĕn'ê-kä*), whose father was a prominent writer, was a Spaniard, born at Corduba (Cordoya) about 4 B. C. He studied law at Rome, where he narrowly escaped being put to death by Emperor Caligula. Later in life he entered the Roman court, but in 41 A. D. lost the favor of Claudius and suffered eight years' banishment to Corsica. After his return he became tutor to Nero, over whom he had a strong and good influence, and was made consul in 57 A. D. by his pupil, who was now emperor. As Nero (*q. v.*) rapidly sank into crime, Seneca's high moral character aroused hatred, while the teacher's wealth, heaped on him by Nero, is said to have made the emperor jealous. Nero tried to poison him, but, failing in this, had him drawn into the Pisonian conspiracy, for which he was tried and condemned. Left free to choose his own death, he opened his veins and bled to death, 65 A. D. Seneca was a noble and upright man, yet had many enemies. *On Foresight*, *On Shortness of Life* and *Epistles to Lucilius* are some of his writings, besides epigrams and eight tragedies, which show great mastery of style but are unfitted for the stage. For a striking portrait of Seneca see Hugh Westbury's *Acté*. Consult, also, Farrar's *Seekers after God* and the *Quo Vadis?* of Sienkiewicz.

Seneca Falls, N. Y., a village in Seneca County, on Seneca River, the Seneca and Cayuga Canal and the N. Y. Central and Lehigh Valley railways, about 40 miles west of Syracuse. It lies in a notable agricultural region, and was early settled; it also has extensive manufactories, which in large measure utilize the waterpower of the river. Among these are pump, fire-engine, automobile, button and machine-tool works. It is the seat of Johnson Home for Indigent Females, Mynderse Academy and Library and Rumsey Hall, a preparatory school; while in the vicinity it has a fine summer-resort in Cayuga Lake Park. Population 6,588.

Seneca Lake, one of a range of narrow lakes in the western part of New York. It is 36 miles long, and averages two miles in width and 530 feet in depth. Steamboats ply daily from end to end. It flows into Lake Ontario through Seneca and Oswego Rivers, and is joined by canal to Erie Canal.

Senecas, one of the Indian tribes. See IROQUOIS.

Sénégal (*sĕn'ê-gal'*) is a French colony on the western coast of Africa between Gambia River and the Sahara. It extends 900 miles inland, covers 80,000 square miles and has 1,200,000 inhabitants. The colony is under civil administration, and comprises the communes of St. Louis, the capital; Dakar, a fortified naval station that is the seat of the general government of French West Africa; Rufisque; and Gorée. These are directly under the governor, and the inhabitants, numbering 107,826, are French citizens and elect a deputy to the Parliament at Paris. The colony also includes nine circles under other administrators, where the natives are not citizens of France, and other districts that govern themselves under French protectorates. Everything outside of the territories mentioned is the Senegal-Niger colony.

French settlement began as early as 1637, but the colony was taken by the English in 1756 and, except in 1779, held till 1815, when it passed permanently into the hands of France. Progress began in 1854, and prosperity has grown ever since. The colony is self-supporting. The chief towns have schools with over 2,000 pupils. The natives cultivate maize, millet and rice. Other products include castor-beans, cocoanuts, ground-nuts, gums, kola and rubber. The domestic animals are camels, cattle, goats and sheep. Copper, gold, mercury and silver are found. The industries comprise brickmaking, jewelry, pottery and weaving. The annual imports are valued at 67,912,239 francs, the exports at 59,164,917 francs. There are nearly 600 miles of railway 1,241 of telegraph and about 200 of telephone. A submarine cable has connected Dakar with Brest, France, since April of 1905. Dakar also has regular steamship-service to French ports. Hamburg and Liverpool. The chief railroad is the line along the coast that connects Dakar, Rufisque and St. Louis. Another runs from Kayes, the head of flood-navigation on Senegal River (490 miles from St. Louis), to the Niger, so that one can go from Paris to Timbuktu by train and steamer. At Dakar extensive improvements, including a dry-dock, have been made.

Sénégal (*Sĕn'ē-gal'*), a river of West Africa, has two sources, the Bafing and the Bakhoy.

These streams meet at Bafulabé, 700 miles from the coast, the united Senegal reaching the Atlantic ten miles below St. Louis. From July to October the river is navigable to within 40 miles of Bafulabé, but the channel has many falls, narrows and low, flat islands. The mouth has been dredged and deepened. A railroad has been built along the left bank for 82 miles from Kayes to Bafulabé, which has been carried to Bamaku on the Niger.

Senegambia-Niger (*sĕn′ ē-găm′ bĭ-ȧ-nī′ jĕr*) since 1902 consists of territories under the administration of the governor-general of French West Africa, and includes some of the older Senegal protectorates, the remnants of the former French Sudan and the Military Territory. (The name "Senegambia" is not used by the French.) It is divided into two parts, one including the old Senegal protectorates as far as Falémé River. The other is bounded on the north by the Algerian sphere, on the west by Falémé River and French Guinea, on the south by the Ivory Coast, Gold Coast, Togoland, Dahomé to the Niger and its left bank to Northern Nigeria, and on the east by the Military Territory from Lake Chad. It therefore includes the valley of the upper Senegal, two thirds of the entire course of the Niger, taking in the great bend and the countries enclosed, and Sahara north to the Algerian sphere of influence. The area is 370,000 square miles, the population 8,000,000. It is all under civil administration, with its budget balancing in 1907 at 6,963,500 francs, and has a regular judicial and educational system a complete system of telegraph lines, good roads between all important centers and the Senegal-Niger railway completed from Kayes through Bamaku to Kulikoro, 349 miles. In 1905 the expenditure for railway construction amounted to 688,000 francs.

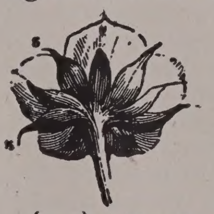
Senn, Nicholas, an eminent surgeon, was born in Switzerland in 1844, and brought to the United States in 1853. He was educated in the public schools of Wisconsin, and graduated from Chicago Medical College in 1868 and from the University of Munich in 1878. He practiced his profession in Milwaukee and Chicago, where he was connected with the best medical schools and societies and gained a wide reputation. He was delegate to the International Medical Congress at Berlin in 1890, Moscow in 1897 and Madrid in 1903. He was the author of many works on medical and allied subjects — among them *Medico-Surgical Aspects of the Spanish-American War* and *Our National Recreation Parks.* His death occurred in Chicago in 1908.

Sennacherib (*sĕn-năk′ ē-rĭb*), an Assyrian king, son of Sargon, reigned from 705 to 681 B. C. He built the embankment of the Tigris, made canals and water-courses, built a huge palace at Nineveh, and was the founder of many other public works. See ASSYRIA.

Sen′sitive Plants. All plants are more or less sensitive, that is, able to respond to stimuli. Some plants, however, respond so quickly and so evidently that they have been popularly called sensitive plants. Conspicuous among them are species of mimosa, acacia and their allies, members of the pea family. These particular plants have large, compound leaves composed of numerous and very small leaflets. At a sudden touch the paired leaflets fold together, or the whole leaf may fold up and its petiole droop. In the natural surroundings of these plants this folding of the leaves has to do with the avoidance of too intense light or drought, the surface of exposure thus being diminished in exact proportion to the need.

Seoul (*se-o͞ol′*), capital of Korea (*q.v.*), is on the Han, 75 miles from its entrance into the Yellow Sea. It is in a basin in the midst of granite hills and is surrounded by a wall. Narrow, dirty streets; wide, open squares; poorly built houses; and a royal palace covering 600 acres make the city. Silk, paper, tobacco, mats and fans are produced. Population 196,646.

Se′pal (in plants), one of the parts which together make up the calyx or outer set of floral leaves. See FLOWER.



(*s, s*) SEPALS

Separator, Cream. See CREAM-SEPARATOR.

Se′poy, a native Hindu soldier, as distinguished from a *gora* or white soldier. Sepoys have always been volunteers. The French first employed them in the 18th century. The East India Company had 10,000 Sepoys at the time of the battle of Plassy. This force had grown to 45,000 by the time the first governor-general was appointed (1773). Their discipline, faithfulness and good services caused general belief in their loyalty until the outbreak of the Sepoy rebellion in 1857. The army was then 300,000 strong, all Sepoys but 40,000. The rising took place among the high-caste Hindus, who made up the Bengal army. The Sepoy forces of Madras, Bombay and the Punjab took no part in it. This rebellion cost the British $200,000,000. Since 1857 the proportion of Sepoys to Europeans is less, it being now two to one instead of six to one.

Septem′ber, from the Latin word meaning seven, was the seventh month of the Roman calendar, but is the ninth according to our reckoning. The Anglo-Saxons called it *gerst-monath* or barley-month.

Sequoia (*sē-kwoi′ ȧ*), a genus of the Conifers, whose two species are native only in California. They are the famous redwoods or Big Trees and form one of the attractions to visitors in California. The species are *S. sempervirens*, the true redwood, and *S. gigantea*, the giant redwood. The former grows only in the Coast Ranges, and is abundant enough to be a very important lumber tree. The recorded sizes are from 50 to 75 feet in circumference and 200 to 300 feet in height. It is one of the most important timber-trees in the world. The Pacific coast is supplied by the redwood with much of its building and fencing lumber. The tree does not thrive away from the sea-fog, all redwood forests being in a strip 20 to 25 miles wide and in length 500 miles. It has marvelous reproductive powers; persistently throws up shoots when cut or fallen, resists fire well, and quickly makes new forests. The giant redwood occurs in groves in a narrow strip along the western slope of the Sierra Nevada. Among the most famous groves are those of Calaveras County and the Mariposa grove just south of the Yosemite. The latter contains one of the largest standing trees, known as the Grizzly Giant, whose trunk at the ground is more than 93 feet in circumference. The age of the largest trees is from 2,000 to 2,500 years. In former ages sequoias were widely distributed throughout the world. As the last survivors of a very ancient and wonderful family, as well as for their own majesty, they are of the greatest interest and value. Nevertheless, many of the giant redwoods of private ownership have been sacrificed for money. A generous gift of a public-spirited citizen, William Kent of Chicago, has provided for the preservation, some few miles out from San Francisco, of a tract heavily wooded with virgin timber, chiefly redwood and Douglas fir. Mr. Kent purchased the forest with the purpose of having it established as a government reserve, and in January of 1908 the government accepted the generous offer; and Muir Woods, the name given to the beautiful cañon forest by the donor, now belong to the nation. See FOREST-RESERVES and MUIR, JOHN.

Sera'pis, the Greek name of an Egyptian god, introduced into Egypt in the time of Ptolemy Soter. He was a combination of the Greek Hades and the Egyptian Osiris. It is said that 42 temples were built for the worship of this god, though they were admitted only into the Greek cities founded in Egypt. The best known of these temples was the magnificent Serapeum at Alexandria, to which was joined the celebrated Alexandrine Library. Antoninus Pius introduced the worship of Serapis into Rome, but it was soon abolished. Many Roman coins have his image joined to that of Isis. The worship of Serapis ceased in Egypt only when his image in Alexandria was destroyed by its Christian archbishop in 398 A. D.

Serf. See SLAVERY.

Ser'pentine, a mineral made up of silica, magnesia and water, with a little protoxide of iron. Serpentine is usually found in masses, never in crystals; is generally some shade of green, but sometimes is red or brownish-yellow; and feels smooth, but often greasy. Precious or noble serpentine is a rich, dark green, hard enough to take a good polish, translucent and sometimes having garnets imbedded, which form red spots and add to its beauty. It is a rather rare mineral, and is found at Baireuth (Germany), in Corsica and in the Shetland Islands. The Romans made of it beautiful pillars; and boxes, vases etc. are still cut from it. Marmolite is a scaly serpentine; chrysolite is a kind with delicate fibers and a silky luster. Common serpentine is a rock rather than a mineral. Its name comes from its being often marked with winding veins. Its color usually is green or red, often mottled, veined or clouded.

Ser'pents. See SNAKES.

Serpent-Wor'ship is one of the oldest forms of religion, and still exists among many savage peoples. Serpent-worship is prominent in Hinduism. We see traces of it in the great serpent which defended the citadel of Athens, fed every month with honey-cakes. Among Zulus harmless green or brown snakes which come boldly into the houses are thought to be ancestors, and are often identified by some scar or mark, such as the man bore in life. Serpents are often looked upon as the embodiment of gods, as was the rattlesnake worshiped in the Natchez temple of the Sun; the Phœnician serpent with its tail in its mouth, an emblem of eternity. Reverence for the serpent is notable among the American Indians, where its name has been given to rivers, as the Kennebec and the Antietam. Among the Dakotas, Shawnees and Sacs the words for spirit and snake are similar. The Algonquins think the lightning a huge snake, and the Caribs speak of the god of the thunder-storm as a mighty serpent. The Ojibways dread to kill a rattlesnake, and, if they find one in their path, beseech it to go away and spare them and their families. The same worship is found among the Cherokees and other tribes as well as in the strange snake-dances of the Zuñis. See Fergusson's *Tree and Serpent Worship*.

Se'rum. The blood in the bloodvessels consists of two parts: the solid, which includes both kinds of corpuscles, and the liquid, called the plasma. When blood escapes from the bloodvessels, it first becomes viscid or like a jelly. If this jelly-like mass is left standing some time, it separates into two parts, a liquid, which is the serum, and a solid clot which floats upon the serum. Now, the clot is found to contain practically all the corpuscles and also a network of fine threads called fibrin. Hence, as the corpuscles were there before, we must conclude that the plasma, which is liquid in the body, has now separated into two parts,—fibrin and serum. Serum, as a separate substance, therefore, is never found in the body; and its functions are included in those of the plasma. But in modern medicine a distinct branch of therapeutics or the science of healing takes advantage of the fact that healthy serum possesses power to fight with and destroy certain dangerous bacteria. In vaccination for smallpox the poison of the disease is itself introduced directly into the body, and the blood in the body develops power to destroy this small amount of poison. In so doing it retains power to fight a later infection of the disease itself, because the *antitoxin* or *poison-fighting* substance thus developed in the body remains there for some time. Now, if we infect, for example, a horse with a disease, as pneumonia, the animal's blood develops this power to fight the disease; and if we slowly increase the infection the blood slowly acquires a very great *antitoxin* power. If we then remove some of the blood and secure the serum as above, the antitoxin power is in the serum. Antitoxin serum has been of more use in diphtheria than in any other disease. Children suffering from diphtheria die in 35 to 40% of cases; but where the antitoxin serum for diphtheria is injected while they are suffering from the disease, they die only in 9 to 13% of the cases. Tetanus (lockjaw) was fatal in practically 100% of cases; but antitetanic serum has reduced the mortality to about 35%. The method is of no use, it seems, in some diseases, as cancer, and of little if any service in others, as tuberculosis.

Servia (*sẽr′vĭ-ȧ*), a kingdom of the Balkan peninsula. Soon after the European War began the spelling was changed from "Servia" to "Serbia"—the form used by all except the English speaking peoples. The Serbians objected to the "v" because it suggested the Latin word for slave, "servus."

Most of the farmers use clumsy wooden carts drawn by oxen or—in southern Serbia—buffaloes. The Serbians, well-built and stalwart, and, like all mountaineers, fierce fighters in war, are kind and hospitable in peace and the first farmer you meet will offer you a seat in his cart and is glad to share with you the shelter and the simple table fare of his home which includes corn cakes three times a day. The mother of the household will bring out her delicious plum marmalade which the Serbians make and export; for plum orchards are to the Serbians what apple orchards are to us. Although they grow wheat they raise mostly Indian corn because they want it for their pigs, their cattle and their corn cakes.

In the more primitive regions the "zadruga," an ancient institution reaching clear back to prehistoric times, still survives. These zadrugas are community groups of families related to one another. They live in separate cottages but have a large building in common in which they eat and spend the evenings amusing themselves—the men talking politics (of which they never tire), the women spinning, the children playing or all of them singing or listening to songs about the heroes of the nation contained in their legends and ballads of medieval wars.

Over these groups is a housefather or "staryeschina" and housemother or "domanyitsa" who assigns the household work. Zadrugas were very prosperous and never had any trouble in getting their sowing and reaping done as there were so many hands to work as well as mouths to be filled with corn cakes, pig's meat and marmalade and they combined to buy whatever their little group needed.

In recent years a co-operative system established by King Alexander, modelled after the German system, has largely taken the place of the zadrugas, and the little farms of today do not exceed twenty acres. A Serbian farmer cannot lose all his possessions under a mortgage as an American farmer can because the law will not allow him to give, or another to take, a mortgage covering more than a certain proportion of his land and his cottage he cannot mortgage at all—nor his garden, his plow or the cattle necessary to draw the plow or haul his products to market.

Although, as you may imagine, there are no very rich people neither are there any very poor ones. There are practically no paupers and there are no poorhouses. The people are not so thrifty nor so industrious as the Bulgars nor so clever as the Roumanians, and comparatively few are interested in export statistics or the growth of manufactures. In fact, the Serbian feels that he forfeits his independence by working in a factory. There are meat packing plants, flour mills, breweries, iron foundries, potteries, sugar, tobacco and celluloid factories and mills for weaving hemp, flax and wool but the workers are mainly Austro-Hungarians or Gypsies. There are a few home industries including the making of corded sandals such as peasants wear; handwoven carpets and rugs. They also export native wines, mainly to France and Switzerland. A serious drawback to the commercial development of Serbia has been the lack of seaports, which places the country at the mercy of hostile tariffs; so you can understand why so many wars have been fought all over Europe to get control of seaports.

Serbia is a mountainous country covered with fine forests, from which you can see why it is, in proportion to population, that Serbia has more sheep and hogs than any country in Europe. The sheep are pastured on the slopes and the pigs fattened on the beech nuts and acorns that cover the forest floors. Up to the European War they exported—mainly to Austria because of the seaport situation—cattle, sheep, hogs, hides, wool, timber, copper and their luscious plum marmalade, and imported manufactured articles, chiefly from Austria, Germany and Great Britain.

Simple in their tastes, a moderate amount of work enables the Serbian to live as well as he cares to and to spend his evenings talking politics, dancing or singing. These songs—these legends—keep alive the dream of a reunion of the race in a Serbian Empire like that overthrown when they were conquered and subjected by the Turks in 1389. The most momentous event, not only in the history of Serbia but in the history of Europe, was the assassination of the Crown Prince of Austria by Serbian students in Zaregevo, Bosnia, thus precipitating the European War (*q. v.*). (Consult Laneleye's *Balkan Peninsula* on Serbia previous to the war.)

Her first independent monarch was crowned as Milan I in 1882. He gave up the throne to his son Alexander, then 13 years old, in 1889. On June 11, 1903, King Alexander and Queen Draga were assassinated as the result of a conspiracy in the palace and Peter Karageorgevitch as Peter I succeeded him. Their religion is the Greek-Orthodox. The monarchy is constitutional and hereditary.

Sesostris (*sē-sŏs′trĭs*), the Greek name of a celebrated Egyptian king. According to the Greek accounts, Sesostris at the head of a large army invaded Libya, Arabia, Asia, Europe, Thrace and Scythia, leaving a colony at Colchis on his way home. In the south he conquered Ethiopia, and by means of his fleet on the Red Sea got possession of the neighboring islands and widened his dominions to India itself. Captives in great numbers were put to work on temples, canals and mounds. Sesostris is said to have gone blind after a reign of 33 years, and to have taken his own life. Just who this great conqueror was is a puzzle. The most reasonable explanation is that his doings are the confused exploits of Sethos I and Rameses II.

Se′ton, Ernest Thompson, lecturer, illustrator and author, was born in South Shields, England, in 1860; but spent his boyhood and youth (from 1866) in Canada and on the western plains. He was educated in Toronto, Canada, and London, England In 1891 he became naturalist to the government of Manitoba; and wrote not only serious works upon the *Birds of Manitoba* and the *Mammals of Manitoba*, but clever and attractive tales for magazines, which purported to be based on actual observation of the ways of animal life. Mr. Seton contributed a number of illustrations to *The Century Dictionary*. He is the author and illustrator of *Art Anatomy of Animals; Wild Animals I have Known; The Trail of the Sandhill Stag; The Biography of a Grizzly, Lobo, Rag and Vixen; Lives of the Hunted, Pictures of Wild Animals; Two Little Savages; and Krag and Johnny Bear.*

Set′ter, a breed of dog employed in shooting birds. There are three varieties — the English, the Gordon and the Irish setter. Dogs had been trained from the 16th century to scent game, but it was not until the beginning of the 19th century that a record of a distinct breed of setter was begun. The English setter generally is white with red markings or with black spots. The Gordon setter was bred by the duke of Gordon in 1800, by crossing the existing setter with the collie. This setter should be a rich and glossy black, marked with tan on the face, chest and legs. The origin of the Irish setter with its deep chestnut-red color is unknown. See DOG.

Sev′en Sleep′ers, the heroes of a celebrated tale. During the flight of the Christians from the persecution under Decius seven Christians of Ephesus took refuge in a cave near the city, where they were discovered by their pursuers, who walled the entrance to starve them to death. Instead they fell into a sleep which lasted from 250 or 251 to the reign of Theodosius (447). They imagined that their sleep had been but for a night. One of the seven went secretly into the city to buy food, and was thunderstuck to see the cross on churches and other buildings. Offering a coin of Decius at a bakery he was arrested, his startling story not being believed till he guided the citizens to the cave where he had left his comrades. The emperor heard enough from their lips to make him believe in the life beyond the grave, whereupon they sank again to sleep till the resurrection. The Roman church holds their festival on June 27. The story was adopted by Mohammed. A like story is told in Germany. See Rydberg's *Teutonic Mythology*.

Seven Wise Men, Greek sages, whose lives were embodied in certain maxims. Their names and characteristic sayings are as follows: Solon of Athens — "Nothing in excess"; Thales of Miletus — "Suretyship brings ruin"; Pittacus of Mitylene — "Know thine opportunity"; Bias of Priene in Ionia — "Too many workers spoil the work"; Chilon of Sparta — "Know thyself"; Cleobulus, tyrant of Lindus in Rhodes — "Moderation is the chief good"; and Periander, tyrant of Corinth — "Forethought in all things."

Seven Won′ders of the World were in early times reckoned to be the Pyramids of Egypt, the Hanging (that is, terraced) Gardens of Semiramis at Babylon, the Temple of Diana at Ephesus the Statue of Jupiter at Athens by Pheidias, the Mausoleum, the Colossus at Rhodes and the Pharos (or lighthouse) at Alexandria.

Seven Years' War (1756-63). A struggle in Europe, which had far-reaching results, between Prussia under Frederick the Great and a confederacy of European powers, consisting mainly of Austria under Empress Maria Theresa, Russia, Saxony, Sweden and France. The immediate object of the war was to enable Austria to regain possession of Silesia, duchies which had in 1740 been seized by Frederick, and this precipitated a strife known as the Seven Years' War or the third Silesian War. With Prussia was allied England under George II, who sought thus to secure his Hanoverian possessions against France, and between which and the English there had been a growing ill-feeling in consequence of rivalry in the American colonies and in India. On the part of the confederacy of Austria, Russia and France the feeling that led to the war was European jealousy of the growing power of Prussia, whose prestige had been greatly raised by the genius of Frederick. On the outbreak of the war he made himself master of Saxony by the defeat of the Austrians at Lobositz (October, 1756), temporarily invaded Bohemia, and gain inflicted defeat upon the Austrians (at Prague, May, 1757), followed by victories later in the year over the French and Austrians at Rossbach and over the Austrians alone at Leuthen (December, 1757). Through varying fortune Frederick's military genius enabled him in the two ensuing years to wrest victories from the Russians at Zorndorf and from the French at Minden, though his capital was taken by the Russians and was subjected to three days' plunder. In 1761 the English, owing to the death of George II, withdrew their subsidies to Prussia; but Frederick's straits were somewhat relieved in the following year, when Elizabeth of Russia died and Peter III, her successor, in his few months' reign made peace with Prussia. Sweden and France fell away from the alliance, and at Hubertusburg, Austria, too weak to carry on the war alone, made peace with Prussia, Feb. 15, 1763, and Silesia was confirmed as a possession of Frederick.

Aside from European complications, there was at this time, between England and France, cause enough for war in the friction between the two nations, owing to their rivalries in India and in North America and to the desire of both to settle who should be master of these vast domains. France had colonized Canada and Louisiana, while England had established colonies along that part of the Atlantic coast which separated the French settlements. To connect the latter and to exclude England from the great fur-trade of the interior, France erected military posts from Niagara River to the mouth of the Mississippi. This was naturally resented by England and her colonies, and precipitated a conflict in the Ohio Valley and on the St. Lawrence, which had its fateful issue in the conquest of Quebec and the surrender of Canada to Britain. In India English prowess met with like good fortune. The East India Company had founded settlements for trade, which gave promise of extending to an empire; but France, jealous of her hereditary rival, endeavored to snatch the prize. Dupleix, the French governor of Pondicherry, captured Madras, and by intriguing with the native princes attempted to make French power supreme over the country. In this ambitious scheme he was checkmated by Lord Clive, who from a clerkship in the East India Company rose to be one of the greatest of English generals and the savior of India. Clive captured Arcot, and in 1757, when the sovereignty of Bengal was in peril, he won a great victory over the native insurgents at Plassey, which made Bengal a British province, saved the English residents from massacre, and, in spite of the atrocity of the Black Hole at Calcutta, laid the foundations of British rule in India. The war, which raised Prussia to the front rank among European powers and developed England's colonial empire, was marked by naval victories which fell to the English, as the affairs at Louisbourg, Lagos and Quiberon Bay. Consult Carlyle's *Frederick the Great;* lives of *William Pitt*, *General Wolfe* and *Lord Clive;* and Parkman's *Montcalm and Wolfe.* See FRENCH AND INDIAN WAR.

Severn (*sĕv′ẽrn*), the second largest river of England, rises in Wales and after 210 miles falls into Bristol Channel. It is navigable for 180 miles; a canal has helped navigation from Gloucester, and is now being extended to Worcester. Below Gloucester the swiftly flowing tide produces a bore or wave five or six feet high. The Severn is a beautiful as well as an important river.

Severus (*sē-vē′rŭs*), **Alexander,** a Roman emperor, was born about 205 A. D. He was the adopted son of Emperor Heliogabalus, who, in his jealousy of the young man's popularity, vainly tried to kill him. Severus became emperor in 222. His first nine years were peaceful, but in 231 he began a war with the Persians, in which he was successful. In 235 he began a campaign against the Germans on the Rhine, in which he lost his life, not at the hands of the enemy, but at those of his own soldiers.

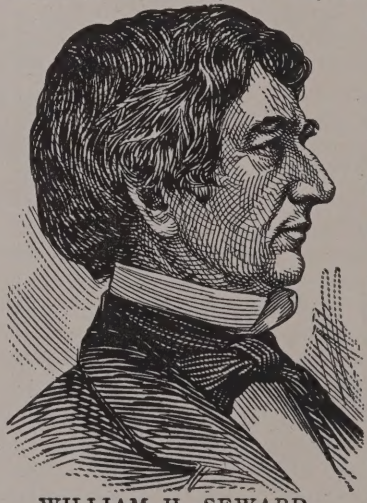
Severus, L. Septimius, a Roman emperor and a vigorous and courageous soldier, was born in Africa in 146 A. D. At the time of the murder of Pertinax (193) he was in command of an army in Pannonia and Illyria. At once proclaimed emperor, he marched on Rome, which was held by Julianus, who had obtained the throne by bribery. Julianus and the murderers of Pertinax were punished, one rival, Clodius Albinus, won by the gift of the title of Cæsar, the soldiers flattered by a rich largess, and a second rival conquered at Issus. A glorious campaign in the east and the three years' siege and capture of Byzantium were followed by a hard struggle with the jealous Clodius, whom he defeated near Lyons in 197. After the usual games to the citizens of Rome and largesses to the troops, he marched on the Parthians and took and plundered their capital. By 202 he was again in Rome, pleasing the people with shows of unheard-of magnificence and showering gold upon citizens and officers. In 208 he marched at the head of a large army to put down a rebellion in Britain, and repaired Hadrian's wall, which is often called after him. He died at York (*Eboracum*) on Feb. 4. 211.

Sevier (*sė-vēr′*), **John,** American politician and celebrated pioneer and Indian-fighter, was born in Rockingham County, Virginia, in 1745; and died in Georgia in 1815. He married at 17; and at 19 founded a village in Shenandoah Valley. This settlement grew into the town of Newmarket. He was a captain in the Virginia Line during Lord Dunmore's colonial war (1774). It was he who requested the annexation to North Carolina of what is now Tennessee. After the War of the Revolution this region became ambitious for an independent government; and one was actually formed. Sevier became governor of this attempted state, which was called Franklin. North Carolina broke up the government and imprisoned Sevier. He escaped, and in 1790 was returned to Congress. He was made Tennessee's first governor when it was formed into a state (1796). This office he held until 1801; and again from 1803 to 1809. From 1811 he served four years in Congress. Sevier's death took place while he was engaged in negotiations with the Creek Indians.

Sévigné (*sa′ven′ya′*), **Madame de,** the queen of letter-writers, was born at Paris, as Marie de Rabutin-Chantal, Feb. 6, 1626. At 18 she married a spendthrift marquis, whom she forgave and loved. At the death of her husband in 1651, she was brilliant in beauty and fascination. The prince of Conti, Turenne, Rohan and others courted her in vain. But no woman ever knew, as she did, how to change a lover into a friend, and perhaps no one ever had so many and such friends. But as to love,—that was wholly bound up in her son and daughter. The marriage of the dughter to the Count of Grignan, lieutenant-general of Provence, obliged her to live away from Paris. This separation from her daughter was the grief of Madame de Sevigne's life, but it is mainly to it that we owe those letters, extending over the 25 years till her death These letters tell the inner history of the time in great detail; but are most valuable as mere letters, charming in their good sense, sparkling wit and inbreathed affection. The writer died on April 18. 1696 Consult Amelia Gere Mason's *Women of the French Salons.* See LETTERS.

Seville (*sȧ-vēl′yȧ*), one of the most famous Spanish cities, is on the Guadalquivir, 62 miles northeast of Cadiz. Up to a short time ago Seville had the appearance of a picturesque Moorish town—narrow shaded streets, houses built around handsome courts and gardens and fountain-studded squares. But now room has been made for wide, straight streets and modern houses and shops. The great ornament of the city is its Gothic cathedral, the second largest in the world, containing paintings by Murillo and others, a great organ, the tombs of Ferdinand III of Castile and Ferdinand the son of Columbus and fine bronze, sculptured and wood-carving work. Close beside stands the beautiful tower called Giralda, 275 feet high. Another of the glories of Seville is the Alcazar or Moorish royal palace, whose halls and gardens are surpassed only by those of the Alhambra. The museum and charity hospital contain masterpieces by Murillo. The bull-ring can accommodate 18,000 spectators. The leading manufactures are cigars, iron, machinery and pottery. Seville also is a large port of entry. The largest imports are chemicals and timber; the chief exports, lead, quicksilver, wine, copper, oranges, olives, olive-oil and corks. This city was the Roman *Hispalis,* a place of trade in those days. Under the name of *Ishbilia* from 712 to 1248 it was an important Moorish city. When Ferdinand III of Castile captured it (1248), about 300,000 Moors abandoned the place. Population 155,366. Seville or Sevilla also is a province. Area 5,428 square miles; population 587,186.

Sevres (*sâ′vr′*), a small town in France, 2½ miles southwest of Paris, celebrated for its porcelain. Sèvres vases are of great value and are known the world over. Painted glass and mosaic are also made. Porcelain has been manufactured under state control since 1756. Population 8,000. See Garnier's *Soft Porcelain of Sèvres.*



WILLIAM H SEWARD

Seward (*sū′ẽrd*), **William Henry,** was born at Florida, N. Y., May 16, 1801. He graduated at Union College in 1820, and became a lawyer. He joined the Whigs, being the party leader in the state senate from 1830 to 1834. Defeated for the governorship in 1834, he was elected in 1838 and 1840. He refused a nomination for a third term, and between 1843 and 1849, when he entered the United States senate, he gained an enviable reputation as a criminal and patent lawyer. While governor he had refused to surrender to the governor of Virginia three negro seamen, demanded on the charge of inciting a slave to escape. He was against the admission of Texas as a slave-holding state, and thus became marked as an opponent of slavery. His speech in defense of Freeman, a negro murderer, Gladstone has called "the greatest forensic effort in the English language." Two terms as senator brought him to the front as an able and patriotic statesman, and when the Republican party was formed he became one of its first leaders. A strong candidate for the presidential nomination in 1860, Seward entered Lincoln's cabinet at its head, filling the office of secretary of state from 1861 to 1869. His moderation in the *Trent* affair, in which he advised giving up the envoys, as demanded by England, probably saved us from a war with Britain. His claim for damages from the English government, because of the *Alabama* being fitted out in British ports, was sustained. His most important service to the country, perhaps, was his purchase of Alaska (*q. v.*) from Russia in 1867. In the spring of 1865 Mr. Seward was thrown from his carriage, breaking his jaw and an arm. While confined to bed, on the night of Lincoln's assassination, April 14, one of the conspirators made his way to the secretary's room and severely cut his face and neck. Seward died at Auburn, N. Y., Oct. 10, 1872. Consult *Life and Letters* by his son.

Sew'erage, a system of underground pipes or conduits for the removal of sewage or the rain-water of a place. Sewerage is required for sanitary reasons in towns and cities. In the country, where population is not dense, sewage can be disposed of without any elaborate system, though care must always be taken that the water-supply is not contaminated. The construction of elaborate sewer-systems is found in ancient cities, as Babylon, Jerusalem and Rome, but it is only within recent years that it has received the attention it deserves in modern cities. There are two systems in use,—the combined and the separate system. In the combined system the same pipes carry both the sewage and the storm-water; in the separate system, called the Waring system, there are separate pipes for the sewage and for the storm-water. In the latter system the flushing is done by automatic flush-tanks supplied with water from the town waterworks The separate system is recommended by most sanitary engineers. The liquid sewage may flow due to the fall of the pipes, but in many cases pumping has to be resorted to. Among the methods of sewerage disposal are the following: (*a*) by dilution by discharge into a large mass of flowing water which is not used for a water-supply, as at New York City and in towns on the lower Mississippi; (*b*) by running the liquid sewage over a large area of land and letting it oxidize in the air; and (*c*) by chemical treatment to kill the organic life. In some cases, as at Berlin, Germany, the sewage is used to fertilize land which is cultivated. Chicago has constructed a drainage canal at a cost of $53,000,000 to dispose of its sewage by dilution with a large body of water taken from Lake Michigan and emptied into Illinois River.

Sew'ing-Machine', a machine which takes the place of the old-fashioned needle and thread in sewing garments. Several attempts were made in England and the United States to invent a machine for sewing, but without much success until Elias Howe of Cambridge, Mass., patented his first machine in 1846. This machine uses the lock-stitch, which is used by most machines now, and from 1854 until the patents expired Howe received a royalty on every machine made, amounting to over $2,000,000. The lock-stitch makes use of two threads, one in the needle which pushes the thread down through the cloth, forming a loop; the other thread is wound on a bobbin and placed in a shuttle which carries the second thread through the loop made by the first one. The rotating hook is used instead of a shuttle in some machines. The loop-stitch is made by a curved needle, which catches the loop made by the upper needle and passes the thread through it. The most important improvement on Howe's original machine was made by Allan B. Wilson in his "four-motioned feed," which carries the work along and has been adopted in all machines. There are a large variety of machines, differing slightly, and also those made for different purposes. The family sewing-machine has revolutionized the work of the home; the button-hole machine cuts the hole, works it around, bars the ends, stops of itself when it is done, and makes 6,000 buttonholes in a day. The carpet-sewing machine, the cylinder machine for stitching mailbags, satchels, shoes, water-hose and all kinds of leather work; the universal arm-feeder machine for making gloves; the basting and quilting machine; and the pattern-stitching machine are a few of the varieties in use. The largest sewing-machine manufacturing company is the Singer, which has factories in Scotland, Austria, Canada and the United States. Since 1878, when the principal patents expired, the price of sewing-machines has been much reduced.

Sex'tant. See QUAD'RANT.

Sex'ual Spore (in plants), a spore which has been produced by the union of two gametes, that is, by fertilization. The general name of such a spore is oöspore or fertilized egg. The name is unfortunate, since the spore is not sexual, the full phrase merely meaning a sexually formed spore. See SPORE.

Seychelles (*sā'shĕl'*) **Archipelago,** 89 islands and islets belonging to Great Britain, in the Indian Ocean, off Zanzibar on the eastern coast of Africa and north of Mauritius. Their total estimated area, with dependencies, is about 150 square miles, with a population estimated at 20,767. Formerly administered from Mauritius, the islands are under an executive council, with an administrator who has the rank of Governor. The capital is Victoria on Mahé Island, which has a good harbor and has lately been made a coaling-station. Communication with the islands is had by the steamers of the Messageries Maritimes, which ply once a month (carrying the mails) between Marseilles and Mauritius, and occasionally by the steamers of the British India Steam Navigation Company. The islands have had telegraphic communication with Mauritius and with Europe since 1893. There are good schools on the islands, with good roads on the chief islands, as Mahé, Praslin and La Digue. The imports from the Seychelles into Great Britain (chiefly of drugs) amount in value to about $150,000: the exports consist of vanilla, cocoanut-oil, soap, guano, salt-fish, tortoise-shell, coffee and cocoa. Consult Salmon's *Crown-Colonies of Great Britain* and Belcher's *Account of the Seychelles.*

Sey′mour, Hora′tio, was born at Pompey, N. Y., May 31, 1810. He studied at a military school and became a lawyer. In 1841 he entered the New York assembly as a Democrat, and was three times re-elected, in 1845 being chosen speaker. Defeated for governor in 1850, he was elected by a large majority two years later. Seymour came into great prominence as one of New York's war-governors, holding this office during the draft-riots in New York City. He presided over the Democratic national convention of 1868, which was held in New York City. He had refused to be a candidate, but on the 22d ballot was nominated for the presidency by a sudden wave of enthusiasm, in spite of his loudly spoken protestations. He, however, received but 80 electoral votes. He died at Utica, N. Y., Feb. 12, 1886.

Sforza (*sfôr′tsȧ*), **Frances′co,** when 23 succeeded his father, Muzio Attendolo, the founder of the family, who was called Sforza, meaning "stormer" (of cities), in command of a famous band of *condottiere*, soldiers who sold their swords to the highest bidder. He fought at times for and against the pope, Milan, Venice, and Florence. He invented a better system of tactics than had been in use, and it soon came to be taken for granted that victory was certain for the party which had his support. So it came about naturally that the peasant chief won the hand of Bianca, the only child of the duke of Milan. Meanwhile Sforza wrested Ancona and Pesaro from the pope. At the death of his father-in-law in 1450, he gained the dukedom by a combination of stratagem and force. He made firm his authority over all Lombardy and several districts south of the Po, gained the favor of Louis XI, who gave him Savona and Genoa, and won the love of all his subjects. Though himself ignorant, he loved and protected letters. Sforza died on March 8, 1466, and was followed by five dukes of his family.

Shad, an important food-fish belonging to the herring family. The American shad is more valued than the European species. It ranges along the Atlantic coast from New England to the Gulf of Mexico, and ascends different rivers to spawn. This species has been successfully introduced on the Pacific coast. The full-grown fish is about 30 inches long. Its color is bluish, with silvery sides and usually a dark blotch behind the gill-covers and, often, several in a row behind this. These fish were among the first to be protected and artificially propagated by the United States Fish Commission. The result of this care was to increase their numbers greatly. Statistics show that the catch of shad in 1890 was two and one half times that of 1880.

Shad′dock, a native tree of the East Indies, which has been long grown in southern Europe. Its name is said to come from Captain Shaddock, who introduced it into the West Indies in 1810. It has large, white flowers, and its fruit also is very large, sometimes weighing from 10 to 14 pounds, roundish and pale yellow. The pulp is green and watery, and has a slight acid taste. Finer and smaller than the shaddock proper is the pomelo (also called pummelo, pompelmoose and grapefruit), a variety rather larger than an orange, which bears its fruit in clusters. Both kinds are grown in Florida and sold in the north.

Shad′ow, in optics the region immediately behind an opaque object which cannot be illuminated by a source of light in front of the opaque object. If the source of light is a single point, we find that the shadow is geometrically similar to the outline of the opaque object, which is a consequence of the fact that light moves in straight lines in a homogenous medium. Such a shadow is exhibited in Fig. 1. In case the luminous source is not a single point, but an extended body, we find that the shadow consists of two parts, one a central, dark area, called the *umbra*, the other a partly illuminated border, called the *penumbra*. This is well-illustrated in the case of the sun and earth shown in Fig. 2. The penumbra, as will be evident from the figure, is merely that region which is illuminated by some but not all points on the luminous source The more nearly

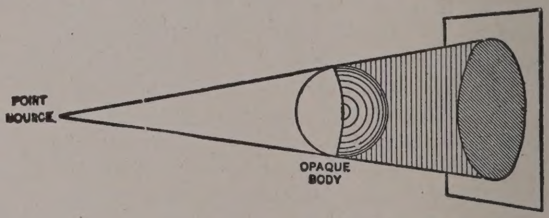


FIG. 1

a source approximates a point, the more nearly does the penumbra vanish. This almost complete absence of penumbra is well-shown in the shadows cast by naked electric arcs. In case a shadow is produced

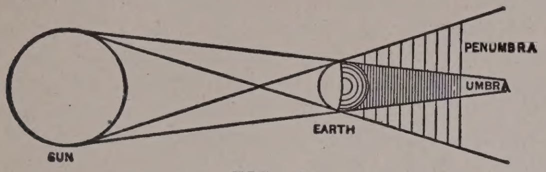


FIG. 2

by a point-source it is always accompanied by a series of diffraction-fringes, called, after their discoverer, Grimaldi's fringes. These are beautifully shown in the case of the naked arc-light, where the first three fringes of the series are easily seen bordering the shadow of each twig on a tree or the shadow of one's lead-pencil cast on a sheet of white paper. For explanation of these fringes see Preston's *Theory of Light.*

Shaf'ter, William Rufus, American general, was born at Galesburg, Mich., Oct. 16 1835. In 1861 he entered the Union army as lieutenant in the 7th regiment of Michigan volunteers, and distinguished himself in the campaigns under McClellan in Virginia. He rose to be lieutenant-colonel and subsequently was brevetted brigadier-general for gallantry in action. When the volunteer army was disbanded at the close of the Civil War, he entered the regular army as lieutenant-colonel of the 41st United States infantry. After this he rose to be colonel, and then brigadier-general in 1897 On the outbreak of the war with Spain (*q. v.*) he was put in command of an expedition to Cuba (*q. v.*) with the rank of major-general of volunteers. In May 1898, he proceeded to Tampa, Fla., then to Cuba, where, in June and July, he commanded the military operations which ended in the capitulation of Santiago (*q. v.*) de Cuba and the surrender of General Linares' army of over 20,000 men. He subsequently was in command of the department of California and the Columbia, and was retired on June 30, 1901. He died on Nov. 12, 1906. See Spanish-American War.

Shag. See Cor'morant.

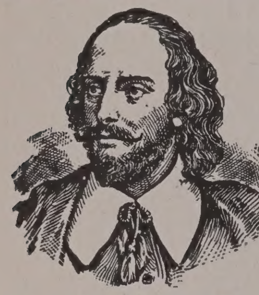
Shagreen', a name given to the skins of sharks, rays and other fish of the same family. These skins have a covering of small, hard grains, which stand wear better than ordinary leather. Such skins, when prepared like parchment and dyed and smoothed, have an attractive look, and are used for covering small caskets, cigar-cases, spectacle-cases and small boxes. The name "shagreen," a Persian word meaning the back of a beast of burden, is also, and perhaps was first, given to skins of horses, asses and other animals, prepared by unhairing and scraping them. Each piece is then stretched on a frame; and, while still moist, the seeds of a kind of chenopodium are sprinkled on the surface and forced in by the feet or a press. When the skin is dry, the seeds are beaten out, leaving a pitted appearance. It is then pared down and placed in water, till the pits swell and give the skin a pimpled look, like that of the shark. The covers of old Persian manuscripts are made of this shagreen, which is also used in the east for horse-trappings and shoes. Wood is embossed sometimes in a like way.

Shah, the title applied by Europeans to the ruler of Persia. It is a general name for king, widely used in southern and central Asia. The full Persian form is *Padishah.*

Shah-Jehan', the fifth of the Mogul emperors of Delhi. For the last four years of the reign of his father, Emperor Jahangir, he was in open rebellion. Greeted as emperor by the nobles on Jahangir's death in 1627, he began a warlike and successful reign, conquering the Deccan kings of Ahmadnagur, Bijapur and Golconda. He was an able and just ruler, and a good business-manager as well. The magnificence of his court was unequaled. The splendid peacock-throne was built by his orders at a cost of nearly $35,000,000 Of other great public buildings which remain as a monument of his greatness are the grand *Taj-Mahal* (*q. v.*) and the matchless pearl-mosque at Agra and the palace and great mosque at Delhi. He was deposed in 1658 by Aurungzeb, his son, and died in 1666.

Shah'jahan'pur, a city of British India, in the northwestern provinces, is 100 miles northwest of Lucknow. It takes its name from Shah-Jehan, in whose reign it was founded in 1647. It was a hotbed of rebellion during the mutiny of 1857-8. Sugar is made and exported here. Population 76.458.

Shak'ers, a religious sect. They arose in England about the middle of the 18th century, under the leadership of James Wardlaw and his wife. They were Quakers, but professed to have had a revelation that the second coming of Christ was at hand and that he would appear in the form of a woman. Ann Lee was one of their first converts, and her preaching drew such crowds that she and the Wardlaws were imprisoned. While in prison she professed to have received another revelation, which made her accepted as the female Christ whose reign had been promised. She was called Mother Lee, and is considered the head of the Shakers. The new kingdom, by revelation they learned, was to be set up in America, and the first settlement was made in Albany County, New York, five miles from Albany. Their special doctrines are holding property in common; celibacy or refraining from marriage; and the duty of labor They live in families of brothers and sisters, presided over by elders and elderesses and deacons and deaconesses. They are very neat and industrious, and are known for their flower-seeds and herbs which they raise for market. They make use of singing and dancing in their worship, which has given them their name, their own title being the United Society of Believers in Christ's Second Appearing. They have 15 settlements in the United States, several of them called Lebanon, from New Lebanon, N. Y., which was the second established in the country. Their property is valued at $10,000,000, and they number 1,000 members. See LEE, ANN, and Evans's *The Shakers.*


WILLIAM SHAKESPEARE

Shake'speare, William, the world's greatest poet and dramatist, was born at Stratford-on-Avon, England, near the end of April, 1564, the oldest son and third child of John Shakespeare. He probably went to free school at Stratford. In 1578 his father, who could not sign his own name but had risen to be high bailiff of Stratford, began to lose money. It is thought that soon after this William was taken out of school, and either apprenticed to a butcher or else worked as a lawyer's clerk. In 1582 Shakespeare married Anne Hathaway. He had three children: a daughter, Susanna, and twins — a boy, Hammet, who died when 12, and a girl, Judith. Both daughters outlived their father. A story has come to us, whether true or not is not known, that Shakespeare's first attempt at poetry was a ballad at the expense of Sir Thomas Lucy, whose deer-park the poet with some companions had robbed. The angry squire had prosecuted him, hence the satirical ballad. This unfortunate piece of poetry only made matters worse, and is said to have caused him to run off to London. Here, according to one account, he was employed holding at the playhouse-door the horses of those theatergoers who came without their servants. However, we know nothing certain of this part of his life. But in 1592 we find a reference to him in Henry Chettle's pamphlet, *Kind-Harts Dream*, which appeared in that year. Chettle speaks of him as "exelent in the qualitie he professes"— that is, acting — and praises his "uprightness of deeling" and "his facetious grace in writing." In spite, though, of Chettle's approval, it is certain that Shakespeare was not great as an actor. He did, indeed, have the pleasure of playing several times before Queen Elizabeth, whom he compliments in *Midsummer Night's Dream.* However, the great poet was not himself a mere dreamer. He soon became a theatrical shareholder, by 1597 was able to buy a home at Stratford, and in 1602 purchased a place of 107 acres near by.

Probably in 1589-90 Shakespeare began his career as a playwright. Among his earliest comedies were *Love's Labour's Lost, The Comedy of Errors* and *The Two Gentlemen of Verona;* among his earliest historical dramas were the second and third parts of *Henry VI*, *King Richard III* and *King Richard II;* the first romantic tragedy was *Romeo and Juliet.* The other two early plays of *Titus Andronicus* and the *First Part of Henry VI* were, it is thought, partly the work of other hands. This greatest of series of plays thus begun was ended by *King Henry VIII* (1612-13), which critics think was written in part by Fletcher.

While writing, Shakespeare still continued to act; he is known to have played a part in Jonson's *Sejanus* in 1603 or 1604, but it is not known when he left the stage. Shakespeare died at Stratford-on-Avon, April 23, 1616, which is supposed to have been the anniversary of his birthday. See Morley's *English Literature;* Brandes's *Wm Shakespeare;* Moulton's and R. G. White's *Studies;* and Sidney Lee's *Life.*

Shale, a variety of sedimentary rock formed from beds of mud or clay. The mud or clay was originally deposited in lakes or in the sea. Compacted by its own weight or by the weight of sediments laid down above it, and cemented by mineral matter deposited from solution by the waters percolating through it, the mud or clay becomes shale. Shales are of various degrees of hardness according to the degree of cementation, compression etc. Some shale breaks into slabs appropriate for the construction of walks. Such shale is *flagstone.* Shale occurs in rock-systems of all ages later than Archean (See GEOLOGY.) Soft shale is often ground into clay for the manufacture of brick, tiles etc. When subjected to compression great enough to render it partially metamorphic, shale is converted into slate. If the metamorphism go still further, shale may be converted into crystalline schist, as mica-schist.

Sha'ler, Nathaniel Southgate, American geologist and paleontologist, was born at Newport, Ky., Feb. 22, 1841, and graduated at Lawrence Scientific School, Harvard, of which he was dean and professor of geology. After 1884 he also was geologist in charge of the Atlantic division of the United States geological survey and member of the National Academy of Sciences. For seven vears (1873-80) he had charge of the geological survey of Kentucky, devoting part of each year to that work, and publishing many volumes as the result of his labors. His writings embrace *Nature and Man in North America; Aspects of the Earth; The Story of Our Continent; Sea and Land; A First Book in Geology; The Interpretation* *of Nature; Features of Coasts and Oceans;* and *Kentucky.* His death occurred on April 10, 1906.

Shamo'kin, Pa., a borough of Northumberland County, eastern central Pennsylvania, 20 miles south of Danville, Montour County, and 18 southeast of Sunbury, the county-seat. It is on the Northern Central and Reading railroads, in the center of the great anthracite region. It contains manufactories, machine-shops, foundries, flour and planing mills and other industries. The town has good schools, several churches, a public library and all improvements of a progressive place. Population 25,000.

Sham'rock, a ternate-leaved plant, adopted by the Irish as their national emblem. There have been many warm disputes to determine the veritable shamrock. Some writers contend for the woodsorrel, the leaves of which unfold about St. Patrick's Day, while others claim that the white clover is the favored plant. Legends make out that St. Patrick (*q. v.*), when preaching the Gospel to the benighted inhabitants of Ireland, illustrated the great doctrines of the trinity by the triple leaf of the shamrock. The leaf of the white clover is the one now generally worn by Irishmen on St. Patrick's Day.

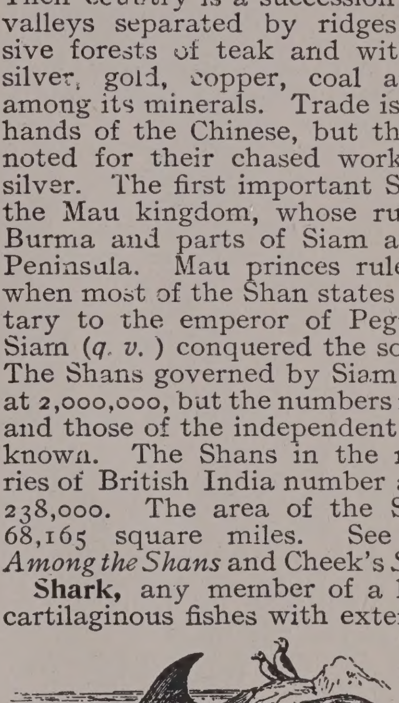
Shanghai (*shăng-hä'ī*), a city in central China, in the province of Kiangsu and its most important seaport, is 12 miles from the mouth of the Yangtse-Kiang. The Chinese part of the city has narrow, dirty streets, and is surrounded by a wall, with crowded suburbs. The French and English portions on the north, parallel with the river, are well-lighted and paved, with handsome houses and fine public buildings. The city is strongly fortified. Shanghai was opened to foreign commerce in 1842, and has a large trade with Great Britain, Hong-Kong, India and the United States in silk, tea, cotton, rice, sugar, paper, hemp, wheat, oils, flower and fruit-seeds, fans and medicines. About 2,900 vessels enter the port annually. Population 1,350,000.

Shan'ly, Charles Dawson, poet, humorist and engineer, was born in Dublin, Ireland, March 9, 1811, and educated at Trinity College. He came to Canada and settled near London, Ont., in 1836, soon afterwards editing *Punch in Canada.* He was the engineer of Hoosac Tunnel, and well-known both in Canada and the United States as a humorist, art-critic and writer of ballads and serious as well as lighter verse. He died in Florida, while in search of health, on April 15, 1875.

Shan'non, the largest river of Ireland, rises in Cuilcagh Mountains and flows into the Atlantic on the southwestern coast of Ireland. From Limerick to the sea, a distance of 70 miles, it forms an estuary or inlet ten miles wide at the sea. Large vessels can reach Limerick, and smaller ones ascend as far as Athlone, while two canals connect the river with Dublin.

Shans, a group of tribes living on the borders of Burma, Siam and China. They are descended from one of the original races of China, and have been pushed southward, entering the valley of the Irawadi about the 6th century. The Shans and the Laos (*q. v.*) are the same people, and both are closely related to the Siamese. They are a lazy, gay people, fond of gambling and cock-fighting, though not unwarlike. The women enjoy equal freedom with the men; slavery in a mild form exists; and serfdom is universal. Their religion is Buddhism. Their country is a succession of wide river-valleys separated by ridges, with extensive forests of teak and with iron, rubies, silver, gold, copper, coal and petroleum among its minerals. Trade is largely in the hands of the Chinese, but the Siamese are noted for their chased work in gold and silver. The first important Shan state was the Mau kingdom, whose ruler conquered Burma and parts of Siam and the Malay Peninsula. Mau princes ruled until 1554, when most of the Shan states became tributary to the emperor of Pegu. In 1774-7 Siam (*q. v.*) conquered the southern states. The Shans governed by Siam are estimated at 2,000,000, but the numbers ruled by China and those of the independent tribes are unknown. The Shans in the native territories of British India number approximately 238,000. The area of the Shan states is 68,165 square miles. See Colquhoun's *Among the Shans* and Cheek's *Siam and Laos.*

Shark, any member of a large group of cartilaginous fishes with external gill-clefts. The sharks, rays and skates are united into a large sub-class of fishes called *Selachii.* The sharks have gill-openings along the sides of the neck, while the rays and skates have them on the under surface of the expanded head. Sharks vary in size from the dogfishes (*q. v.*), about three feet long, to the basking shark, 35 or 40 feet long. They are very voracious and destroy many fish. With four exceptions all are carnivorous. They are more numerous in warm seas, but are widely distributed. The white shark, which reaches 25 feet, is the so-called man-eater. These animals are common in warm seas and occasionally wander to our coasts. They follow ships for great distances to obtain the refuse thrown overboard. The blue shark, from 15 to 20 feet long, shares the title of man-eater with the foregoing. Among the sharks found along the Atlantic



WHITE SHARK

coast of the United States are the dogfish sharks, about 3 feet long; the sand-sharks, about 6 feet long; the mackerel-sharks, 8 to 15 feet long; the hammerhead sharks, 15 to 20 feet long; the small hammerheads, 3 to 5 feet long; the thresher-sharks, about 20 feet long; and other sharks that appear occasionally. The sharks represent a very ancient family of fishes, with many clues to ancestral history. Their development is of special interest to naturalists. Their fin-rays are used in China for making gelatine, their livers produce oil and their rough skin, called shagreen (*q. v.*), was formerly used in place of sandpaper.

Shar'on, Pa., a borough in Mercer County, on Shenango River and on the Erie and Pennsylvania and Lake Shore and Mich. Southern railways, about 70 miles northwest of Pittsburgh. Settled in 1705, the place was incorporated as a borough in 1841. It has rolling-mills, coke, steel, brass and cement works, an ordnance-foundry, nail, chain and stove works, lumber, planing and flour mills besides manufactories of malleable-steel castings, explosives, tinware and brick and tile works. Natural gas is found in the region, which is also rich in coal and iron. Besides its churches, public offices and schools, it also has Hall Institute (Baptist), a secondary school. Population 30,000.

Shaw, Albert, editor of *The American Monthly Review of Reviews*, was born at Shandon, Butler County, Ohio, in 1857. He graduated from Iowa College, Grinnell, Iowa, in 1877. While an undergraduate he showed an aptitude for literary work and was one of the editors of the college-paper. Later he owned and published a newspaper at Grinnell. He took his Ph. D. at Johns Hopkins in history and political science in 1884. Dr. Shaw's graduate-work attracted the attention of James Bryce, then preparing *The American Commonwealth*, and to him Mr. Shaw's knowledge of politics in the west was of great service. In reciprocation Mr. Bryce gave the latter access to such English periodicals as *The Contemporary* and *The Fortnightly Review*, to both of which he has since contributed many articles. He studied in Europe in 1888-9 and in 1891. In the latter year he became editor of *The American Review of Reviews*. He is a member of many learned societies. He has delivered many lectures upon the problems of municipal government at the best-known universities. Among his publications are *Local Government in Illinois; Co-operation in The Northwest; Municipal Government in Great Britain;* and *Iowa* in the American Commonwealth Series.

Shaw, George Bernard, critic, essayist and dramatist, was born in Dublin, Ireland, in 1856. In 1876 he settled in London. In 1884 he became a member of the Fabian Society. To *The Star*, *The World* and *The Saturday Review* he contributed weekly articles on music and the theater. Mr. Shaw's plays are writings of a somewhat revolutionary character in that he is dissatisfied with existing social conventions. Among his novels are *The Irrational Knot*, *Love Among the Artists*, *Cashel Byron's Profession* and *The Unsocial Socialist*. His plays include *Admirable Bashville*, *Plays Pleasant and Unpleasant*, *Three Plays for Puritans*, *Captain Brassbound's Conversion*, *Man and Superman*, *Mrs. Warren's Profession* and *John Bull's Other Island*. His essays include *The Quintessence of Ibsenism*, *The Perfect Wagnerite*, *Anarchism versus State Socialism; The Commonsense of Municipal Trading*, *Fabian Essays on Socialism* and *Dramatic Opinions and Essays*.

Shaw, Henry W., an American humorist, was born at Lanesborough, Mass., in 1818. He began to publish his humorous sketches in 1863 under the name of Josh Billings. They consist of quaint maxims, spelled by sound, and were popular. He was a favorite lecturer, and published four volumes of his sketches and a yearly *Farmers' Allminax*. He died at Monterey, Cal., Oct. 14, 1885.

Shaw, Leslie Mortimer, Secretary of the Treasury of United States from 1902 to 1907 and since then president of Carnegie Trust Company, was born at Morristown, Vt., Nov. 2 1848. As a young man he went to Iowa to carve out his fortune. There he worked as farm-hand, school-teacher and salesman for a nursery, paying his way through college. He graduated from Cornell College, Mt. Vernon, Iowa, in 1874 and from Iowa College of Law in 1876. He prospered as a lawyer and banker, and was elected governor of Iowa in 1898 and 1900.

Shawl, an outer garment or outside wrap, which in its present form has been used for centuries. Kashmir shawls are made of the underwool of the Kashmir goat of Tibet. The thread is very fine, selling at $10 a pound, and the colors used in dyeing are permanent, being mostly from native dyes. Some of the shawls are embroidered by hand, but many have the pattern woven into them. Three or four weavers work at one loom, with wooden needles instead of shuttles, and they work on the wrong side of the shawl, where the needles hang in rows. Five shawls are usually made in one year at one loom, though some of the more elaborate take a year in the process of manufacture. The best Kashmir shawls are very high-priced being often valued as high as $1,500 in India. The most beautiful shawls of Persia are made of silk. The manufacture of shawls has been extensively carried on in France, mainly at Paris, Lyons and Nîmes, and also at Paisley, Scotland, and at Lowell and other places in the United States.

Shaw'nee', Okla., a city in Pottawatomie County, on the Rock Island, the Missouri Kansas and Texas, the Santa Fé, and the No. Can. railroads, about 50 miles southeast of Guthrie. Settled in 1895, it was incorporated a city in the following year. Besides its civic buildings and two large parks, it has a Carnegie Library, Curtis Industrial (free) School and a private hospital. Its industries comprise cotton-gins, cotton-compresses, cottonseed-oil mills, brick and tile works and flour-mills. There also are repair-shops of two of the local railways. Population about 19,000.

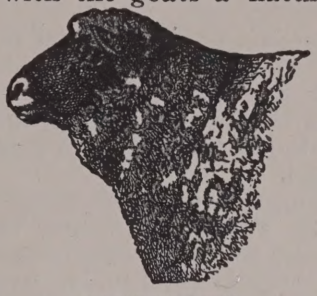
Shawnees, a tribe of American Indians, belonging to the Algonquin family, which first settled in New York, Pennsylvania and Ohio, but were driven west by the Iroquois. They helped the French against the English, and in 1812 sided with the English against the United States. They moved to Missouri, Kansas and Indian Territory.

Shays' Rebellion, a rising in Massachusetts in 1786–7 due to real and fancied grievances, takes its name from the leader, Daniel Shays, who had won the rank of captain in the Revolutionary War. The causes of the uprising were complicated. Probably the financial depression of the time was wrongly attributed to political and legal causes. The agitators objected to the heavy taxation on land, the cost of law-proceedings, the high salaries paid to state officials, the exportation of specie, the oppressive rulings of the courts and the aristocratic character of the state senate. Accordingly in several cities the courts were hindered from sitting by armed mobs. The Supreme Court session at Springfield was broken up by Shays and his followers in the face of the militia. Some concessions were made by the legislature; but the agitation was not checked until the militia fired upon an expedition which Shays was leading against the Federal arsenal. The followers of Shays fled, and after a few other skirmishes had taken place they fled for the most part from Massachusetts Fourteen leaders were condemned to death for high treason, but pardoned. Shays was afterwards pensioned for his services in the War of the Revolution. He died in 1825.

Shear'water, a class of oceanic birds of the petrel family. They are brown birds, about a foot long, with webbed feet. They are night-birds and spend most of their time in flight, but can swim easily. Their single white egg is laid in a hole in the ground. The sooty shearwater is found on the North Atlantic, but goes south for its breeding-grounds. The great shearwater, Manx shearwater of Iceland and Greenland and the dusky shearwater found at the Bermudas and Bahamas are other varieties.

Sheboygan (*shē-boi'gan*), **Wis.,** a city, county-seat of Sheboygan County, is a port on Lake Michigan, at the mouth of Sheboygan River and about 53 miles north of Milwaukee. It has a good harbor. Its industries include furniture, chair, shoe and toy factories, wagon and machinery works, flour-mills, foundries and breweries. It has fine county-buildings and admirable public and parochial schools. It has all improvements of a progressive city and the service of two railroads. Population 35,000.

Sheep, [a group of quadrupeds forming with the goats a natural subfamily. Wild sheep are natives of mountainous regions or of high tablelands. They live in flocks, and take to flight at the call of their leader on the approach of danger, though they can defend themselves when necessary. The ram can carry on a contest with a bull, and is always ready to attack a dog. Wild sheep have short wool, covered with long, straight hair. The great mountain-sheep found in central Asia, with horns sometimes six feet long, and the Rocky-Mountain sheep or bighorn of North America are among the largest varieties of wild sheep. The Iceland sheep, with three, four or even five horns, the broad-tailed sheep found in Asia, its tail weighing from 70 to 80 pounds and carried often on a small carriage, and the Astrakhan and Circassian sheep, remarkable for their fine wool, are noted varieties.



SOUTHDOWN

The common sheep has sprung from the wild animal, and was one of the first animals domesticated by man, as we read in *Genesis* that Abel was "a keeper of sheep." The wool was early used in making cloth, the skin for writing, the milk for a drink and the flesh for food. Sheep pasture on hilly ground, and thus can be profitably raised on land not well-adapted to raising crops. (See Stock-Raising.)

Sheep-raising is carried on extensively in South America, Australia, New Zealand, the western United States, portions of Russia and South Africa. The first sheep were introduced into the United States in 1609, and merino-sheep in 1801. Formerly the majority of sheep in this country were merinos; the tendency now is to increase the mutton-breeds. Owing to various reasons sheep-raising has passed through many changes here; it is now carried on chiefly in the west and middle west and is at its height in the far west — Montana, Wyoming, New Mexico, Utah, Idaho and Oregon.

Formerly sheep were allowed to roam freely on the public lands, but the open range is decreasing, and more grazing-land is now owned or rented.

Sheeps'head, a bony fish common along the Atlantic coast and regarded as one of our best food-fishes. They are distinguished by wide cutting-teeth in the front of their jaws and by grinding-teeth behind. Their food is hard-shelled animals, young oysters, other mollusks, barnacles and the like. They vary in size from two pounds in the south to fifteen in the north, but the average size is about seven pounds. They range from Cape Cod to Texas. The fresh water drum and some other fishes are locally called sheepshead.

The sheepshead gets its name not from the shape of its head, as one would naturally suppose, but from the fact that its teeth resemble those of a sheep in character and arrangement, with the sharp incisor in front and the molars behind.

Shef'field, a manufacturing city of England, is situated in Yorkshire, where the Sheaf and Don Rivers unite, 38 miles south of Leeds. The town is well-built, over $2,000,000 having been spent in street improvements in 1878. The Church of St. Peter, built in the reign of Henry I; St. Mary's, with a fine spire; Albert Hall; Norfolk Market, built by the duke of Norfolk at a cost of $200,000; Music-Hall; and the new town-hall with a statue of Vulcan are among the noticeable buildings. Wesley College, Firth College, Mechanics' Institute, Athenæum, St. George's Museum, founded by Ruskin, and Mappin Art Gallery are some of its institutions. Sheffield has long been noted for its cutlery, the "Sheffield whittle or knife," being spoken of by Chaucer. The Cutlers' Company was founded in 1624, and the cutlers' annual feast dates from that time. The manufactures include brass, iron and steel articles of every kind and armor-plates, railroad-springs, tires and rails.

Sheffield from the Saxon times was the capital of a district belonging to a Norman family named Lovetot, who built a hospital, a mill and a bridge over the Don. It passed by marriage to the Furnivals, and suffered in the Wars of the Barons, the castle being burned and many of the people slaughtered. During the Wars of the Roses the Shrewsbury family, the ruling family of the county, sided with the House of Lancaster. The castle of the earls of Shrewsbury was a fortified building covering four acres of ground, and here Queen Mary of Scotland was imprisoned for 14 years. In 1644 the castle was taken by the army of Parliament, and soon after torn down. In 1864 a reservoir gave way, with terrible effect; 250 lives were lost and millions of property destroyed. Population 478,763. See Gatty's *Sheffield, Past and Present,* and Leader's *Reminiscences of Old Sheffield.*

Shel'byville, Ind., a city, seat of Shelby County, on Blue River and on the Clev., Cin., Chic. and St. Louis and Pittsburg, Cin., Chic. and St. Louis railways, 26 miles southeast of Indianapolis. Besides the city-hall, court-house and Carnegie Public Library, it has attractive buildings, including good schools and churches. It is in a good agricultural region, and ships (besides farm products) live-stock, flour and grain. It has a varied and increasing number of industrial establishments and a rapidly extending trade. Population 10,041.

Shel'drake, a large Old World, salt-water duck of peculiar breeding-habits. The common European sheldrake is about the size of a mallard and brilliant of plumage. The head and neck are green with a white collar, and a broad chestnut band below this, over the chest and back. The shoulders and middle of the under parts are black, the wing-spot is green, and the bill and its knob are bright carmine. These birds breed in sand-dunes, in chambers made by themselves or by rabbits. Nest-chambers, two or three feet deep are made in a grassy hillock. Each nest-chamber is covered by a moveable lid of sod. The nest-chambers are clustered and connected by galleries provided with a common entrance. Sometimes ten or 20 nest chambers will be found in one group. Inhabitants of the sandy islands off the western coast of Jutland plunder these nests by removing the lid. All eggs above six in number are taken, and also the soft down with which the nests are lined. The sheldrakes of the United States are mergansers or fish-ducks, and belong to a distinct group.

Shell, the hard covering of an animal or an egg. While shells exist in great variety, those of the mollusks are the most typical — for example, those of the common snail and the common clam. These shells are secreted by gland-cells in the outer covering of the animal. The outside of a clam shell is a horny layer, differing materially from the inside, which always is pearly. There also is a middle layer, forming a large part of the shell and composed of regular prisms. The clam-shell therefore has three distinct layers — outer, middle and inner. The inner pearly layer is secreted by cells in the general surface of the mantle, while both the outer and middle layers are formed by cells in the thickened margin of the mantle. The substance of the shell largely is carbonate of lime, but the outer layer is horny rather than limy. The immense variety of sea-shells are formed in a similar way, and the shells afford a means of identifying the animals that formed them. The shell or *test* of the sea-urchin is made of six-sided plates of carbonate of lime, secreted by the cells of the outer covering of the body. The shell of the lobster and the crayfish, although formed by a similar process, is, nevertheless, made of a horny substance called chitin. This is also the hard covering of beetles and other insects. The shells of eggs are formed by secreting cells within the walls of the oviduct or tube through which the egg passes before it is laid. The shell of the hen's egg has a deposit of carbonate of lime in it. Some minute animals (*Radiolaria*) have shells formed of quartz or silica, and some secrete a horny covering. The shells of mollusks have been used for money in islands of the southern Pacific, for ornaments, jewelry, for making pearl buttons etc. The study of shells is called conchology. See Woodward's *Manual of the Mollusca*.

Shell, a hollow projectile filled with powder, which is arranged to explode at the right moment and is fired from cannon or other large guns. Shells were first made of cast iron and fired from mortars, and called bombs Used first by the sultan of Gujarat in 1480, they were in general use by the middle of the 17th century. In 1842 Shrapnel shells, named after the inventor, were used in the Peninsular War. They are filled with bullets, instead of powder, and a small charge, just enough to open them when set on fire by a slow match or fuse. Other shells were filled with pieces of iron rings, but the Shrapnel shell is the one most used in warfare. It is especially a man-killing shell, while the common shell was used to destroy material. Carcasses are shells filled with some burning material which will set fire to buildings; hand grenades are small shells filled with gunpowder and exploded by a time-fuse, which are thrown by hand.

The making and use of breechloading and rifled artillery directed ideas about projectiles into new courses. The projectiles are loaded from behind, instead of from in front, as formerly. Consequently they can be slightly larger than the bore, if their excess in size be made of metal soft enough to be jammed into the rifling. Copper bands are fitted around the base, and these take up the rotation imparted by the grooves and effectually check the gas. The projectiles used in modern guns are the same, practically, as canister, common shell and shrapnel; except the armor-piercing shell. This was first designed by Palliser of England. It was made of chilled iron or steel, with an ogive-shaped head, and was strong as well as sharp. It was filled with powder and fitted with a percussion-fuse. Modern, armor-piercing shells are used uncapped or capped. The latest forms of common shell are made with hardened points, and are designed to carry bursting-charges equaling a twentieth of their weight and to penetrate armor at least half a caliber thick. Armor-piercing shells are made of forged and tempered chrome-steel and are intended to penetrate any thickness of armor. They are fitted with fuses that explode the shell when it hits and pierces. High explosives are sometimes used in such shells. When soft-steel caps are fitted to these chrome-steel caps, they penetrate even face-hardened armor without breaking or adhering.

The projectiles of pneumatic guns form a class by themselves. Rockets form still another class. See CANNON, PROJECTILES and SHOT.

Shel'ley, Percy Bysshe, an English poet, was born on Aug. 4, 1792, in Sussex, and studied at Eton and Oxford. At Eton he wrote two romances, and, with a fellow-student, published a volume of verse. While at Oxford with his friend, James Hogg, he published another volume of verse, and in 1811 a pamphlet on the *Necessity of Atheism*, for which the two friends were expelled from University College. These early poems are almost unknown now, and only show the erratic nature of the poet, whose mother, when a school was recommended to her as a place where a boy was taught to think for himself, exclaimed: "Think for himself! I only hope he can be taught to think as others do." At 19 he married Harriet Westbrook, a girl of 16, and lived in Edinburgh and Keswick, where be became a friend of Southey and De Quincey and a disciple of Godwin. His plans for reforming the world he started to carry out by scattering through Ireland his *Address to the Irish People* and other pamphlets and sending adrift in bottles and boxes his *Declaration of Rights*. His *Queen Mab*, written while living in Wales, where he had gone when his servant was imprisoned for nailing up his *Declaration* in public places, was at first privately distributed, because of its religious and political heresies. He left his wife in March, 1814, and in July, 1814, took a journey through France and Switzerland with Godwin's daughter Mary and Miss Clairmont, a relative. After his grandfather's death his income became fixed, and he retired to Bishopsgate near Windsor Forest, where *Alastor* was written. His *Mont Blanc* and *Hymn to Intellectual Beauty* are records of his visits to Lake Geneva, where he met Byron. After the death of his wife he married Mary Godwin, and carried on a long suit to get possession of the children of the first marriage, but was allowed only to appoint their guardians and tutors. His *Revolt of Islam* was his last work in England, which he left for Italy in 1818. At Rome, Florence, Naples, Leghorn and Pisa he spent the rest of his life, surrounded by a circle of friends, which included Byron, Trelawney and Leigh Hunt, and wrote *Prometheus Unbound*, *The Cenci*, *Adonais* and some of his finest lyrics and (in prose) a *Defense of Poetry*. Among his most beautiful minor poems are *Ode to the West Wind*, *The Cloud*, *The Sensitive Plant* and *The*

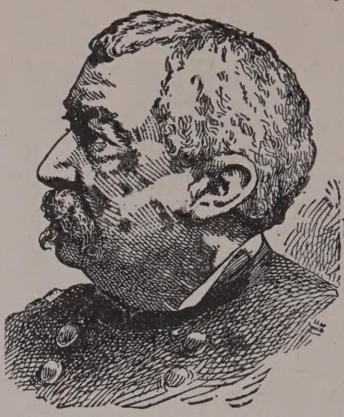
Skylark. Shelley and Williams, his friend, were drowned in a sudden storm on the Gulf of Spezia, July 8, 1822, and the ashes of his body, which was burned in the presence of Byron, Leigh Hunt and Trelawney, were buried at Rome. See *Lives* by Dowden, Hogg, Rossetti, Sharp and Lady Shelley.

Shenandoah (*shĕn'nă-dō'ȧ*), **Pa.,** a borough of Schuylkill County, in the heart of the anthracite region, on the Lehigh Valley, Pennsylvania and Reading railroads, 13 miles northeast of Pottsville, the county-seat, and 84 northwest of Philadelphia. In the 15 collieries in the immediate neighborhood a large number of miners are employed, which greatly aids the town. It has a hat and cap factory, an underwear factory, printing-establishments, machine-shops, mining-tool works, foundries and other industries, several banks, good schools and churches. Population 25,774.

Shenandoah, a river in Virginia, draining the valley between the Blue Ridge and the Alleghenies and running northeast 170 miles to the Potomac at Harper's Ferry. It passes through the richest part of Virginia, and was occupied by both armies, at different times, during the Civil War and was the scene of numerous battles. See SHERIDAN.

Sher'brooke, Can., county-seat of the county of that name in Quebec, is a city of 11,765, the metropolis of the eastern townships. It is at the meeting of Magog and St. Francis Rivers on the Canadian Pacific, Grand Trunk and Quebec Central railways. It is the center of an extensive lumber-trade and of numerous manufactures.

Shere Ali (*shēr ä'lē*), emir of Afghanistan (1863-79), was born in 1825 and died in Russian Turkestan, February, 1879. He had many vicissitudes as a ruler, from the rivalry of those who aspired to the Afghan throne and from the intrigues of Russia, which sought to bring Afghanistan (or Afghan Turkestan) within the sphere of Russian influence. Shere Ali welcomed a political mission from Russia, but declined to receive an English embassy; this aroused the fear of England for its Indian frontiers. Negotiations were fruitless, and the English, pushing forward, occupied Jelalabad and Kandahar. Shere Ali fled to Russian territory, but Yakub, his son, in 1879 proclaimed emir, resisted the further advance of the British; but peace was declared at Gandamak on condition of the emir receiving a British resident at Kabul. This resident was treacherously slain, however, and a religious war was proclaimed. Kandahar now was garrisoned by British troops, and to relieve them Roberts (see ROBERTS, LORD) made his famous march to Kandahar, routed the Afghans, and installed Abdur Rahman (who died in Oct. of 1901) on the throne. See AFGHANISTAN and INDIA.



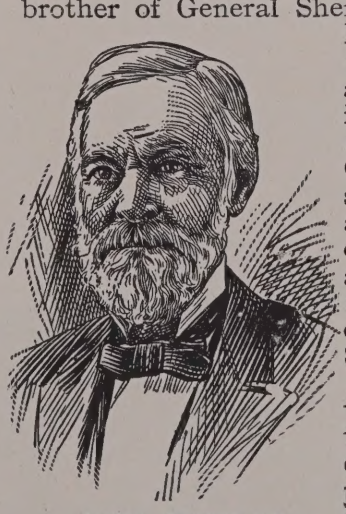
PHILIP H. SHERIDAN

Sher'idan, Philip Henry, American general, was born at Albany, N. Y., March 6, 1831, his parents having arrived from Ireland a few weeks previous to his birth. Soon after his birth the family removed to Ohio, where his boyhood was spent. He was appointed a cadet at West Point, where he graduated in 1853 and was assigned to the 3d infantry as brevet second-lieutenant. When the Civil War broke out, he was a captain in the 13th infantry and was made quartermaster of the Federal army in Missouri. Seeking more active service he was assigned as colonel of the 2d Michigan cavalry, where he soon displayed the qualities which later won worldwide fame. He was soon placed in command of a brigade and then of a division of the army of Ohio. He took part in the battle of Perryville, and won promotion to major-general by his brilliant service in the bloody battle of Stone River on Jan. 2 and 3, 1863, where his division lost over 1,600 men. He also distinguished himself at Missionary Ridge. When Grant was placed at the head of all the armies, he gave Sheridan command of the cavalry of the army of the Potomac. Here he soon distinguished himself in the Wilderness campaign by his celebrated raid around the Confederate army, cutting their lines of communication, advancing nearly to Richmond, and defeating the Confederate cavalry at Yellow Tavern under Stuart (*q. v.*), their renowned leader, who was killed in the fight. In July, when a strong Confederate force under Early had defeated the Federal army in the Shenandoah Valley, penetrating into Maryland and threatening Washington, Grant saw the necessity of putting that department in the hands of an able general, and in August he placed Sheridan in command in the Shenandoah, with instructions to drive the Confederates out of the valley. Sheridan attacked Early at Winchester and again at Fisher's Hill, defeating him at both points, capturing 5,000 prisoners and many guns, and pursuing them to Stanton. In recognition of this service he was made brigadier-general in the regular army. Early's army, receiving large re-enforcements from Lee, again advanced into the valley, surprised the Federal army at Cedar Creek in the early morning of October 19, and drove them back in confusion. Sheridan, who had been called to headquarters at Washington, had reached Winchester on his return, when he heard the guns 20 miles away. Hurrying forward, he reached the field and met his troops retreating in confusion before the enemy. Speedily forming a line to stop stragglers, he rode forward waving his hat and shouting: "Face the other way, boys; we are going back." Confidence was restored, the lines were re-formed, and at 3 P. M. they moved back upon the enemy. The result was the total rout of Early's army, which was pursued up the valley for 30 miles. For this victory he was promoted to be major-general in the regular army, and received the thanks of Congress. Returning to the army of the Potomac in March, 1865, he was conspicuous under Grant in the operations before Petersburg and in the final battles preceding Lee's surrender. It was his superior generalship at Five Forks, where he entrapped and routed the Confederate right under Pickett and Johnson, capturing 5,000 prisoners, which compelled the evacuation of Petersburg. After the close of the war Sheridan was placed in command at New Orleans and, later, of the department of the Missouri, with headquarters at Chicago. When Sherman was made general, Sheridan was made lieutenant-general. When Sherman was retired, a special act of Congress conferred the further rank of general upon Sheridan. As a field-commander Sheridan was unapproachable. Filled with the ardor of battle, so that it was said he raged like a lion, his skill equaled his courage. He never lost a battle; and stood, after Grant and Sherman, one of the greatest of northern generals. Grant said: "As a soldier there is no man living greater than Sheridan. He belongs to the very first rank of captains, not only of our army, but of the world. I rank him with Napoleon, Frederick and the great commanders of history." Shortly before his death, at Nonquitt, Mass., Aug. 5, 1888, Sheridan wrote *Personal Memoirs*.

Sheridan, Richard Brinsley Butler, a British dramatist, was born at Dublin, Sept. 30, 1751. He made his first appearance in a farce called *Jupiter*, written in connection with a school-friend. After marriage he settled in London and produced his first and most popular play, *The Rivals*, in 1775. *The School for Scandal* appeared at Drury Lane Theater, of which Sheridan had become owner, and brought prosperity to it by its popularity. He entered Parliament, became undersecretary for foreign affairs in 1782 and secretary to the treasury in 1783. His high reputation as a speaker rests mainly on his three great speeches during the impeachment of Warren Hastings. His first speech produced such an effect in the house of commons that the house decided to adjourn without voting, because they were too much under the influence of the brilliant orator to vote impartially. He was in Parliament 32 years, and was known as a strong speaker, but only equaled this first great speech in a magnificent oration in 1794 on the French Revolution. Drury Lane Theater became too small, and a new one, built in 1794, was burned in 1809, which left Sheridan in great poverty. He died on July 7, 1816, and was buried in Westminster Abbey. See *Life* by Mrs. Oliphant in the English Men of Letters Series and *Sheridan and His Times* by Thomas Moore.

Sher'man, Tex., a city, the capital of Grayson County, in a rich grain, cotton and fruit-producing district in northern Texas, 61 miles north of Dallas. It is well-supplied by railways, and is an important shipping and manufacturing center. Its industries include a large cottonseed-oil mill, cotton-gins, flour and lumber mills, brick-works, a bag-factory, several foundries and machine-shops, brick and marble works, planing-mills, carriage, furniture, broom and mattress factories. Here are Austin College for boys, North Texas Female College, Sherman Institute, St. Joseph (R.C.) Academy and other institutions. Population 19,000.

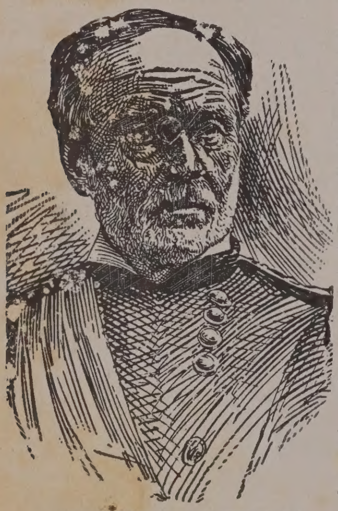
Sherman, James Schoolcraft, Vice President of the United States 1909-1912, was born near Utica, New York, Oct. 24, 1855, and after graduating from Hamilton College began practicing law. He entered the House of Representatives as a Republican in 1887 and served continuously until 1908, with the exception of one term (1891-93), when he failed of election. He was intimately acquainted with public affairs and as a congressman was a member of many important committees. He was the seventh vice president to die in office. In November, 1908, he was elected Vice President and renominated in 1912. He died at Utica during the campaign, Oct. 30, 1912.



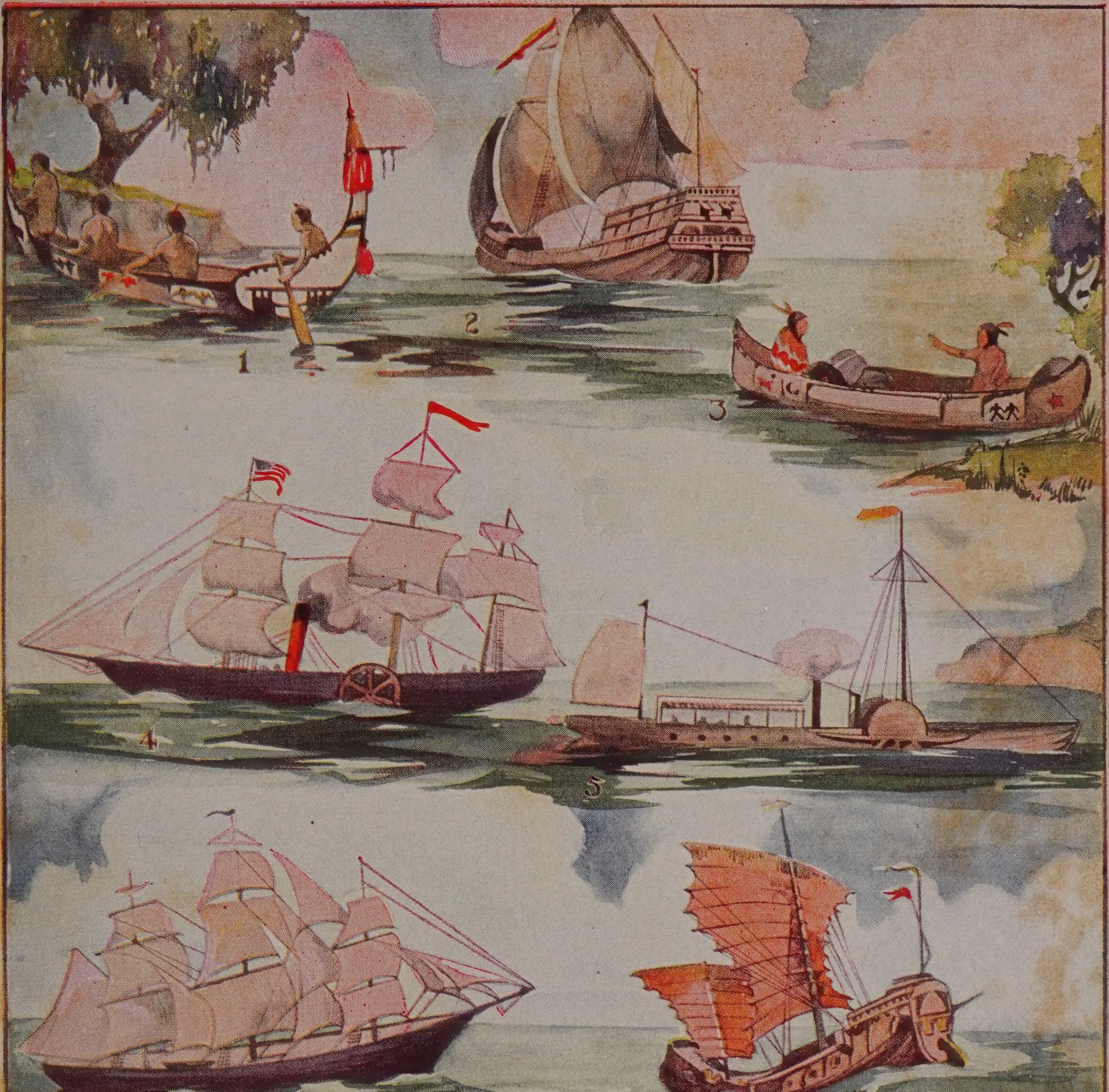
JOHN SHERMAN

Sherman, John, an American statesman, brother of General Sherman, was born at Lancaster, O., May 10, 1823. He was admitted to the bar in 1844, and in 1855–61 he was in Congress as a representative from Ohio and chairman of the committee of ways and means during 1860–61. He was elected United States senator in 1861, and continued to serve Ohio in that capacity, except during the presidency of Hayes, when he was secretary of the treasury (1877-81). In the Civil War he raised a regiment in Ohio, largely at his own expense, and, as chairman of the committee on finance in the senate, helped to plan measures for sustaining the public credit. (See SPECIE-PAYMENTS, RESUMPTION OF.) The bill for the reconstruction of the seceded states was the joint work of Thaddeus Stevens and John Sherman. He was appointed secretary of state by President McKinley in 1897, but resigned because of failing health. Of much interest are his *Recollections of Forty Years.* He died on Oct. 22, 1900. See *Life* by Bronson.

Sherman, Roger, an American statesman, was born at Newton, Mass., April 19, 1721. He was a shoemaker by trade, then a surveyor of lands and finally a lawyer and judge. He was in the Continental and in the United States Congress from 1774 to 1791 He was of the committee that drafted the Declaration of Independence, was one of the signers, and was influential in having it ratified by the convention of Connecticut, where he had resided since 1761. He died at New Haven, Conn., July 23, 1793.


GENERAL SHERMAN

Sherman, Wil'liam Tecum'seh, American general, was born at Lancaster, O., Feb. 8, 1820. He was the son of Judge Charles R. Sherman, who died in 1829, leaving his family in rather straitened circumstances. William was brought up in the family of Thomas Ewing of Lancaster, where he attended Lancaster Academy. From there he went to West Point, where he graduated in 1840, sixth in a class of 43. He served as second-lieutenant in the 3d artillery against the Seminole Indians in Florida in 1840 and 1841. After that he was stationed at Ft. Moultrie, South Carolina, until 1846, when he was sent to California, where he served through the Mexican War and until 1850, having been made captain in 1848. In 1850 he married Ellen Boyle Ewing, daughter of Thomas Ewing. In 1853 he resigned his commission and became a partner in the banking-house of Lucas, Turner and Co. of San Francisco. In 1858 he took up the practice of law in Leavenworth, Kan., but next year became superintendent of the Military Academy at Alexandria, La. This position he held until Louisiana seceded in 1861, when he resigned, and, coming north, was appointed colonel of the 13th infantry in June, 1861. He commanded a brigade in the first battle of Bull Run, and for gallantry in this engagement was made brigadier-general of volunteers on Aug. 3. He was next assigned to a command in Kentucky where, finding his small force entirely inadequate to meet the Confederate army under Breckinridge, which confronted him, he earnestly represented the situation to the secretary of war, stating that it would require 60,000 men to expel the Confederates from the Kentucky line and 200,000 to move offensively to the Gulf and clear the Mississippi valley. For this statement he was charged with being "crazy," but subsequent events proved his judgment sound. Sherman was next ordered to Paducah, Ky., and, after the capture of Ft. Donelson, was put in command of the 5th division of Grant's army. In the battle of Shiloh, April 6, 1862, Sherman held the key to the position, and by his brilliant generalship saved the day. He was in the thickest of the fight, had three horses killed under him, and was twice wounded. Grant said: "Sherman, with raw troops, held the key to the Landing, and to his individual efforts I am indebted for the success of the battle." In recognition of this service he was made major-general of volunteers on May 1, 1862. His next important service was in the operations connected with the siege and capture of Vicksburg. In command of the 15th corps he went down the river from Memphis, the plan being that Sherman should attack Vicksburg, while Grant should move on Jackson. But the capture of Grant's supplies at Holly Springs brought him to a halt, and permitted the enemy to re-enforce Vicksburg. In the meantime Sherman advanced on the city, which he assaulted on Dec. 29 but found impregnable to his force. A few days later, in connection with General McClernand, he stormed Arkansas Post, capturing 7,000 prisoners. In the subsequent battles in the campaign against Vicksburg Sherman bore a conspicuous part. When Grant's rear was threatened by Joseph E. Johnston, Sherman was sent against him and captured Jackson, Miss., dispersing Johnston's army When Grant was sent to succor Rosecrans after the battle of Chickamauga, he called Sherman to his aid and placed him in command of the army of the Tennessee. Here he took part in the battle of Missionary Ridge, where Bragg was defeated and driven into Georgia. He was next sent by Grant to the relief of Burnside, who was besieged by Longstreet at Knoxville. When Grant was called to the head of the army, Sherman was given command of the department of Mississippi and of the three armies of the Ohio, the Cumberland and the Tennessee. On May 5 he began his great campaign against the Confederate army unde ston, which ended in the capture of



WATER TRANSPORTATION—DEVELOPMENT OF MERCANTILE MARINE

1—Fijian Boat. 2—Spanish Caravel Santa Maria: Flag Ship of Christopher Columbus. 3—Indian Canoe 4—"Savannah," the First Steamship to Cross the Atlantic, 1819. The paddle-wheels could be unshipped when the wind was fair. 5—The Clermont, the First Steamboat, invention of Robert Fulton 1807 6—Ship in Full Sail. 7—Chinese Junk. 8—Cunard Liner "Mauretania." 9—A Modern Yacht

lanta and included the battles of Dalton, Resaca, New Hope Church, Kenesaw Mountain and Peach-Tree Creek. After the occupation of Atlanta, the Confederate army under Hood having moved westward, Sherman sent Thomas back to Nashville to confront Hood, while with 65,000 men he began his famous "march to the sea," which was accomplished by the capture of Savannah on Dec. 21. On Feb. 1, 1865, he began his march northward through the Carolinas, closing with the surrender of Johnston's army, April 26, at Durham Station, North Carolina. On May 24, at the head of his magnificent army, which had just completed the march of nearly 2,000 miles in a hostile country, he passed in review before President Johnson, General Grant and thousands of spectators on Pennsylvania Avenue, Washington.

After the war Sherman was appointed to the command of the second military division, with headquarters at St. Louis. When Grant was made general in 1866, Sherman was promoted to be lieutenant-general in the regular army, and, on Grant becoming president in 1869, Sherman was appointed general of the army of the United States. This position he held until, at his own request, Nov. 1, 1883, he was relieved and succeeded by Sheridan. He died at New York, Feb. 14, 1891. Sherman's qualities have, by one well-competent to judge, been summed up thus: "Above all his other excellencies shone his promptitude, celerity and immeasurable activity. What for some commanders were winter-quarters were to him a bivouac. Always ready for the start, indefatigable on the march, omnipresent in battle, relentless in pursuit, Sherman made himself not only more feared but more respected by the enemy than any general in the national armies save, perhaps, the one who commanded them all." In 1875 appeared *Memoirs of General W. T. Sherman by Himself*.

Sher'ry. See WINE.

Sher'wood For'est, a stretch of hilly country in Nottinghamshire, England, about 25 miles long and from six to eight wide. It formerly was a royal forest, and is the scene of many of the exploits of the famous Robin Hood. It is almost entirely cleared now, and occupied by country-seats and parks. See *Nottinghamshire and Sherwood Forest* by White.

Shet'land, a group of islands north of Scotland, forming one of its counties. They number more than 100, 29 being inhabited. There are no trees and only one sixth of the soil is cultivated, but the cliff-scenery is fine and the coast so broken that no spot is more than three miles from the sea. Fisheries form the leading industry. The little, shaggy, Shetland ponies are well-known. Shetland, the *Ultima Thule* of the ancients, belonged to Scandinavia until 1468, and Norse was spoken in Foula in 1774. Area 550 square miles; population 28,166, chief town, Lerwick. See *The Pirate* by Scott and *Orkneys and Shetland* by Tudor.

Shibboleth (*shĭb'bō-lĕth*), a word used by the Gileadites under Jephtha after their victory over the Ephraimites, to test the fugitives at the ford. The Ephraimites could not pronounce the *sh*, but called it *sibboleth*, and so were easily known. The word is still used in the sense of a test.

Shields, South, a town of England, is a seaport in Durham, at the mouth of the Tyne, nine miles northeast of Newcastle-upon-Tyne. The coast is fine, with picturesque caves hollowed out in the cliffs. The south pier, a gigantic breakwater 5,218 feet long was begun in 1854. The harbor is lined with ships and boat-yards, iron, glass, alkali and rope works and paint and varnish factories The Tyne docks also, which cover 50 acres, are near the town. The first lifeboat (*q. v.*) was built at South Shields and used first in 1790. The town was a military station in the time of the Romans; salt-works were established as early as 1489 and glass-works in 1619. Population 111,400

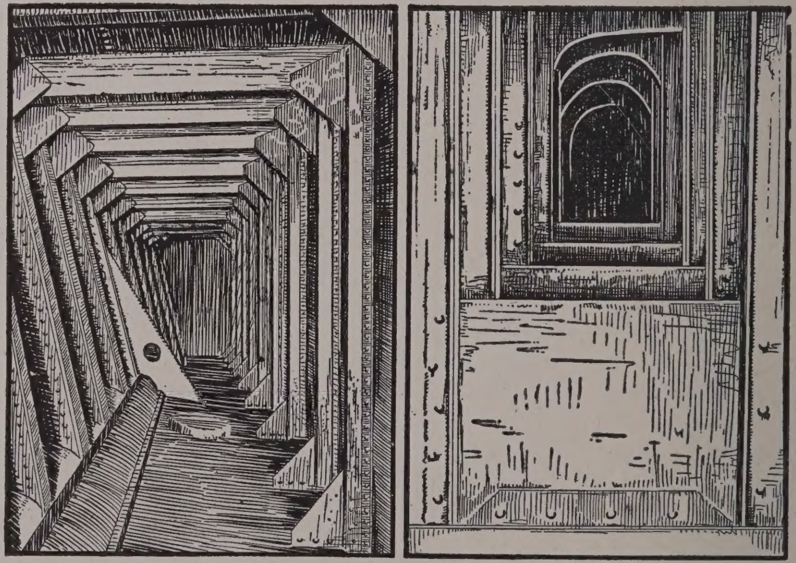
Shill'aber, Benjamin Penhallow, American humorist, known by his pen-name of Mrs. Partington, was born at Portsmouth, N. H., July 12, 1814, and died at Chelsea, Mass., Nov. 25, 1890. Taking early in life to a printing-office, he advanced to journalism, and successively was editor of the Boston *Post*, the *Saturday Evening Gazette* and of a comic journal, *The Carpet-Bag*, to which John G. Saxe was a contributor. In 1854 he published *Life and Sayings of Mrs. Partington*, which gave him a wide reputation. This was followed by many humorous writings.

Shi'loh, a town of Ephraim, the home of Eli and Samuel and the religious center of Israel for many years The site is occupied by a ruinous village, 20 miles northeast of Jerusalem.

Shiloh, Battle of, one of the most desperate battles of the Civil War, named for a log meetinghouse two miles from Pittsburg Landing on Tennessee River. The battle between the Confederates under Johnston and the Federal army under Grant lasted two days. On the first the Federals were driven steadily back, but regained the lost ground on the next day, when re-enforced by Buell's command. Johnston was killed and the Confederates retreated, with nearly equal losses on both sides. The battle began on Sunday, April 6, 1862, and is sometimes called the battle of Pittsburg Landing.

Shin'toism. See JAPAN.

Ship, the name given to most sea-going vessels, but usually applied to sailing-vessels, those moved by steam being called steamers. The art of building vessels that could be moved on water is very ancient, beginning probably with the simplest forms, as the canoe and raft, though Noah's ark was more elaborate and, what is remarkable, its proportions are those still considered the best for all purposes by shipbuilders. It was six times longer than its width, and three fifths of its breadth deep. The nations living around the Mediterranean early learned the art of sailing on the ocean, building wooden vessels moved by oars, as galleys and triremes, and using sails. Their ships in a storm were often bound outside with heavy ropes or even with iron bands carried for the purpose, as the ship in Paul's voyage had to be "undergirded." The Scandinavians were early known as fearless sailors, and their warships were made stronger than the galleys used on the Mediterranean, as they had a fiercer ocean to sail. The English navy was first made of importance by Alfred the Great, who introduced galleys with 40 or 60 oars to defend the coasts against the northern vikings. The crusades made necessary still larger ships and the use of sails, and the *Great Harry*, built by Henry VIII, is considered to be the first ship of the present English fleet. Spain, Portugal, Venice and the Netherlands had large navies in the 15th century. The adventurous spirit which led to the discovery of America and the passage around the Cape of Good Hope increased the demand for improved sailing-vessels, and France, Spain, Sweden and Denmark were noted for their ships. The first ship built in the United States was the *Virginia*, at the mouth of Kennebec River, in 1607, and shipbuilding soon became quite an industry in New England seaports. Their ships were original in plan, and built for special purpose, as frigates for war-vessels, schooners and sloops for coast service, whalers for the whale-fishery and the "clippers" for the China and India trade. The clipper-ship, the *Great Republic*, was the largest merchant-vessel ever built, and many of them equaled in speed the steamships of the period. A ship, strictly speaking, has at least three masts with square sails. Brigs are smaller than ships, having two masts with square sails. Schooners have two or three masts with a variety of sails; and a sloop has only one mast. The cutter is a form of the schooner, and the barkentine is a combination of the ship and the schooner. The introduction of iron and steel and the use of steam have changed the building and the size and form of ships. England has been the great shipbuilding country, but Germany, France, Italy and America have increased their production largely. The Titanic disaster (*q. v.*) resulted in marked changes in shipbuilding and management, the most important of which is the "double skinned" steamship. The Hamburg-American liner Imperator was the first to be built on this principle, while the Olympic, sister of the ill-fated Titanic, originally built with a single hull, was the first to have an inner skin added. Other reforms are the increase of life boats and rafts, the checking of the speed mania and the establishment of a patrol on the North Atlantic steamship lanes to warn liners where there are icebergs or ice fields and how they are moving. All large steamships now have two wireless operators, one of whom is on duty constantly; and, in some cases, two or more captains who relieve each other. It is said that no ship in the plight of the Titanic can ever be lost under similar circumstances. See Galley, Navy, Sails, Shipbuilding, Steamship, Trireme and Yacht; *Shipbuilding Industry of the United States* by Hall; *Modern Shipbuilding and the Men Engaged in It* by Pollock.



New Imperator's Double Hull (left) and Hull added to Olympic (right)

NEW METHOD OF HULL CONSTRUCTION DUE TO TITANIC DISASTER

Ship′build′ing. By ship we mean a seaworthy vessel, as distinguished both from boats and from airships. A true ship became possible when man thought of making a strong frame on which a large number of separate pieces of wood might be placed. This gave size as well as strength. The essential parts of this frame are the keel underneath, the stem and stern posts, upright at either end, and the ribs between, on which the sides may be fastened. The Chinese, the Phœnicians, Greeks and Romans were the great builders of ancient ships. Their progress was chiefly in the direction of building galleys, vessels propelled by oars, in which the rowers commonly sat in two or three decks, one above the other. The rowers' benches gave strength to the structure. A ship 140 feet long and 18 feet wide was considered very large. The vikings of northern Europe had still smaller vessels, in which, however they made more adventurous voyages, sailing to Iceland, Greenland and North America. In 1880 there was unearthed from a burial-mound a viking warship, buried perhaps nine centuries before. It was only 78 feet long and seven wide; its depth was 5¾ feet. The mast was 40 feet high, and it seems to have had one great, square sail. There was no deck. During the middle ages the largest and most formidable warships and the most valued merchant vessels were galleys, which seldom ventured on oceanic voyages. By 1500 larger vessels began to be built, and in 1511 we find that Scotland built *The Great Michael*, 240 feet long and perhaps 50 wide. *The Santa Maria*, in which Columbus sailed across the Atlantic, was 90 feet long and 29 wide. The great proportionate width, when compared with the viking vessel, is noteworthy. In the 17th century, largely stimulated by the necessity of ocean-voyages to America and the Indies and by naval warfare, much more attention was paid to methods of strengthening the frame. In consequence by 1800 there were built vessels of three decks, strong enough to stand the pressure of the tremendous sail-spread that is familiar to us from pictures. By the same time the custom of building ships with very high decks fore and aft, with only a low deck in the center, had disappeared. Galleys, also, had by this time disappeared, except for a few special purposes. England had for a time fallen behind the continent, but at this date we find her stepping to the front of shipbuilding nations. Most remarkable, however, is the prominence of the New England colonies and states. Salem and other ports were active in this line of industry by 1650, though 300 tons was probably the largest size then attempted. By 1800, however, the industry was firmly established, and in the War of 1812 it was the superior construction and design of the American vessels which contributed not a little to the success they enjoyed. American vessels then gained and still retain the first place for speed. In 1862 *The Dreadnought*, an American built "clipper" ship, sailed from Sandy Hook to Queenstown in 9 days and 17 hours, which is the record still for sailing-vessels.

As early as 1701 Denis Papin had experimented with a paddle-wheel steamboat on Fulda River in Germany, Fitch of Connecticut had in 1785 constructed a steamboat, and in 1802 Symington made a steamboat which towed vessels upon the Clyde in Scotland. In 1807 Robert Fulton built *The Clermont*, which for many years carried passengers on the Hudson. In 1819 *The Savannah*, built in New York, crossed the Atlantic, using paddle-wheels in calm weather to supplement her sails. In 1833 *The Royal William*, built in Quebec, steamed across the Atlantic in 22 days. All these vessels were wooden, and combined steam and sail power. American shipyards held their own until iron-vessels were introduced, when British yards rapidly took the business from us, and the ownership of the vessels followed in the same direction. In 1821 the first iron-vessel, a steam canal-boat, *The Aaron Manby*, was built in England. In 1837 the screw-propeller, as invented by Ericsson, took the place of the paddle-wheel for the first time, and rapidly gained in favor. In 1845 *The Great Britain*, an iron screw-steamer, crossed the Atlantic. It was 322 feet long, with a tonnage of 3,270, and was the first vessel of the type of the modern ocean-liner. In 1858 *The Great Eastern*, 680 feet long, of 18,918 tons and of 14 knots' speed, with a combination of paddle-wheel and screw propulsion, set a mark for size which was not equalled till 1901. *The Celtic*, built in that year, exceeded 20,000 tons.

The Alaska, built in 1882, of 6,400 tons, steamed from Queenstown to Sandy Hook in less than seven days; in 1889 *The City of Paris* (10,669 tons) reduced this time to less than six days; and in 1907 *The Lusitania*, soon followed by a sister-ship, easily and regularly completed the passage in much less than five days.

The entrance of the United States into the European War was marked by a revolution in the method of shipbuilding, which not only proved very important in deciding the war but was calculated to have an even more marked effect on the re-establishment of the nation's navy and the restoration of her former prestige in the international merchant marine. The difference between the old method and the new was happily expressed by Chairman Hurley of the United States Shipping Board. He compared the old method and the one which took its place to the two ways of making clothes; the ready-to-wear and the tailor-made systems. Under the old system, in use in Europe and also in this country, before the change, each ship was designed individually and patterns for one ship were not used for another. Furthermore, as the designing and building of the ship both took place in the same yard the parts were not so carefully made and punched for riveting as under the new system. It was to a certain extent a "cut-and-try" system. Under the system introduced by the United States Shipping Board, instead of designing each individual ship, a few standard designs to cover the different types required were adopted and the steel sections were made according to these designs and punched at bridge-building plants scattered all over the country. Then these parts were sent to the ship building yards where they were quickly put together because the shaping of the sections and the punching of the holes was done with almost absolute accuracy. It was to the skill developed in the building of bridges in our land of many rivers that this brilliantly simple idea was due. Both ships and steel bridges are made somewhat like ladies' gowns. That is to say the parts are cut out of steel plates following the pattern of a light wooden frame called a template which corresponds to the paper pattern used by the dressmaker. Experts, working in what is called a "mold-loft," lay out the paper patterns for the ship much as men in a ready-to-wear clothing shop chalk out the parts of garments on the cloth. The mold-loft is a "light-flooded" room large enough for laying out the entire ship in the exact size on the floor. The templates are made from these patterns and sent to the bridge plants.

This method was applied both to the building of war vessels and merchant ships with the result that while, previous to the war, the United States had no international merchant marine worthy of the name, by the fall of 1918 the American Flag was carried on ships with a tonnage of 7,000,000.

As regards material, the advantage of steel and iron over wood is, first, in *weight;* iron saves 30 to 40% in weight compared with wood, and steel nearly 15% compared with iron. Second, as regards safety, steel-ships are far safer than iron or wooden ships, largely because injuries from collisions etc. do not spread so extensively. As regards convenience in manufacture, steel is easier to work when cold than iron, and can be cast or rolled in larger sizes, for many parts of the ship. Both these materials enable a machine to manufacture and substitute *one* piece in many portions of the ship, where, in a wooden vessel, the carpenter must carefully fit together many pieces. The single disadvantage of the metal ship is its greater tendency to become covered with sea weed etc.— that is, to "foul" In consequence it must resort much more often to the docks for cleaning.

Shipbuilding once was a trade and an art It now is an *industry* in which many trades are combined, from boiler-making to electric-wiring and from the calculation of the strains to which the several parts will be submitted to the decoration of the splendid furniture of the finished ocean-liner Again, it is a *science* rather than an art, inasmuch as the builder is guided, not so much by the image and the actual sight of the ship, as by a system of rules and by pages of calculations.

The best ships are built double-bottomed. The keel is laid, and then the bottom is built of a number of cells or steel-boxes. One or more longitudinal bulkheads run the length of the ship. Steel frames take the place of the old wooden ribs, and are so shaped as to connect readily with the other parts of the ship. Plates of the required sizes and shapes are then brought, riveted and calked. The rivets are brought red-hot, placed through holes bored in the plates, and then hammered out so as to stay. As they cool, their grip fastens. Calking is done by hammering a chisel-shaped tool against one plate where it overlaps the next one. The great length of our modern ships is made possible by a truss-construction, not unlike that employed in many steel-bridges. The best ships are divided into many watertight compartments, such that two or more may be filled without causing the ship to sink. These compartments naturally add still more to the strength of the ship. It is common to use the double-bottom to admit water as ballast, where the ship has a light cargo. In simpler ships the frame or rib joins directly to the keel.

Vessels are usually launched when the hull is sufficiently advanced to assure its floating, so as to diminish the weight to be handled in launching. A cradle is commonly built around the ship, which is of wood, and rests on smooth, wooden "ways" which are lubricated with soap etc. These support the vessel beneath and at the sides. The keel rests on blocks, which also support the ship out towards the sides. When these blocks are knocked away, the weight of the ship is transferred to the cradle and to the ways. As these have a slope of about five eighths of an inch to a foot and are well-greased, the ship has only to be released from restraint to start with increasing velocity towards the water. It is at the moment when the restraints have been removed, after the blocks have been knocked away that the ceremony of "christening" the ship commonly takes place. Once the vessel is afloat, the machinery and, if it is a warship, the armament are put in, and the furnishings of the ship are completed. In the case of a modern ocean-liner the rooms are decorated as in the richest hotels.

Many enormous cargo-ships have been built, of which *The Oceanic* of 28 000 tons is an example. These ships have steam or electrical hoisting-engines on their decks, and the masts serve as derricks in port and as signal-posts at sea. Sails they never bear. Oil is shipped in tank-steamers, and wheat-ships have special forms of construction to make the unloading and loading easier.

Most large vessels are now built with two and even more screws. This enables the ship to proceed if one shaft breaks and also to steer with the screws if the steering-gear is broken. The latest improvement in propelling is the use of turbine-engines. In the regular engine there is a backward-and-forward motion of the crank of the engine, which is called a reciprocating engine. In the turbine the steam enters a huge, hollow wheel, and, striking many obstructions in it, imparts a rotary or circular motion to the wheel before it leaves the wheel. The motion of the wheel is so swift that it is not economical to use turbines on any but the faster vessels. A disadvantage of their use is that no way has been found to reverse the turbine, for a ship sometimes has great need to reverse quickly in order to avoid collisions etc. Turbines are now employed in many European vessels, but are not yet in common use in America.

The *Lusitania*, sent to the bottom in 1915 by a German torpedo, was one of the best steamships afloat. Its power was furnished by six turbines, four to drive the ship ahead and two to reverse her motion in case of need. Ordinarily the two latter lay idle. She therefore had four propellers at the stern. Other vessels, larger than the *Lusitania*, are the *Vaterland*, with a tonnage of 54,282, 920 feet long by 100 feet broad; the *Imperator*, tonnage 52,000, 898 feet long by 97 feet broad; the *Europa*, tonnage 50,000, length 911 and width 96. The foregoing gives some idea of the size and construction of modern steamships. Larger and better vessels are continually being built. *The Mauretania* is the same size as the Lusitania was, but is apparently a little slower. The ships are fitted with platforms for six-inch guns, and in time of war can be converted readily into cruisers. See NAVY, SHIP, STEAMSHIP and TURBINE.

Shi'ras, George, American jurist and associate-justice of the United States supreme court, was born at Pittsburgh, Pa., Jan. 26, 1832, and educated at Ohio University, Athens, O. He subsequently graduated at Yale, studied law there, and was admitted to the bar in his native city, where he practiced with success until 1892, when he was appointed to succeed Judge Bradley as associate-justice of the supreme court. He retired Feb. 24, 1903.

Shi'ras, George, born Jan. 1, 1859, son of the above, lawyer and republican congressman from Pennsylvania from 1903 to 1905. He is also a writer of considerable note on biological subjects and legal questions, as well as a very successful amateur photographer of wild animals. He fathered considerable legislation for the protection and preservation of our birds.

Shiraz (*shē'räz*), a city of Persia, celebrated in Persian poetry for its climate, wine, roses and beautiful gardens, is on a broad plain, 35 miles southwest of ancient Persepolis and 217 southeast of Ispahan. The walls are about four miles around, and there were many fine mosques and other buildings until the earthquakes of 1812 and 1824, which destroyed large parts of the city and 4,000 of its inhabitants. An earthquake in 1853 completed the destruction of the city and killed 10,000 people. The city has been rebuilt, and its wine, which resembles Tokay, is still famous. Rosewater is made in large quantities, and very fine inlaid work is produced. The city was a favorite resort of the Persian princes and was the home of Hafiz and Sádi, the poets, whose tombs are in the neighborhood. Population 50,000.

Shishak (*shī'shăk*), the name of several kings of Egypt belonging to the 22d or Bubastite dynasty (10th century B. C.). The name of Shishak or Sheshonk I is found on the porch of the great temple of Karnak and on several statues of a goddess, which probably came from Luxor. Jeroboam, it is recorded in *Kings*, fled to Shishak when Solomon wished to kill him, and on his return became king of the new kingdom of Israel, which was formed by the ten tribes revolting from Rehoboam. Shishak marched against Rehoboam in the fifth year of his reign, and took Jerusalem and the treasures of the temple. This conquest of Jerusalem is recorded on the monuments of Karnak, where Shishak is represented as dragging before his god, Ammon, three rows of prisoners, marked with the names of such places as Judæa, Megiddo and Ajalon.

Shoe'mak'ing is an industry which probably was introduced into the United States by Thomas Beard on the third voyage of *The Mayflower*. Shoes were made entirely by hand until the introduction of a nailing and lasting machine by M. J. Brunel, an Englishman, in 1810. By 1850 the parts of shoemaking had become divided among sets of workmen, so that one set did the cutting, another the sewing, and yet another the lasting, pegging and trimming. But in 1850 the leather began to be rolled by machinery; and in 1860 the McKay sewing-machine was introduced for sewing together the soles and the uppers. At present the fastening is done by means of a welt, a strip of leather sown to the upper and bent over the sole of the shoe. The making of shoes at present calls for little hand-work, except that in the case of the best soles the leather is often cut for the uppers by hand for the sake of ensuring the flawlessness and uniformity of the piece. The leather is pared by a machine, rolled solid by a machine, often cut by a machine, stitched by a sewing-machine (often by several, one for each seam), and often lasted, soled and heeled by a machine. The soles of course are always cut separately from the uppers; and the heels are usually cut and built up separately by a machine before they are fastened to the shoe. Finally a machine is used for trimming and polishing. In the United States about $120,000,000 is invested in the manufacture of shoes; and the annual output is probably worth $300,000,000. Yet these figures represent only about 1,600 great shoe-factories.

Shoot. In the higher plants the main axis of the body grows in two directions. In general, that part of it which grows downward is the root and that which grows upward is the shoot. In ferns and seed-plants the shoot for the most part is differentiated into stem (often with branches) and leaves. In ordinary liverworts (as *Marchantia*) and in the sporophyte of mosses the shoot is not so differentiated.

Short′hand or **Phonog′raphy** is a mode of writing which has been invented to enable one to write as rapidly as a man can speak. The first system appeared in 1588, and nearly 200 different systems have been developed and published. Sir Isaac Pitman's (*q. v.*) system, called phonography, was published in 1837 and is largely used, though some improvements have been made in it. It has been adapted to the Japanese, French, Italian, German, Dutch, Spanish, Hindu and Malagasi languages. It is based on the use of characters to represent the sounds instead of the letters of the English language. The characters used, curves, lines, dashes, etc., also stand not only for a sound but for words which occur very frequently, as the, and, it, etc., called letter-words or grammalogues. The marks also indicate the vowels by their position on, above or below the line. By the use of shorthand a reporter writes 200 words a minute. Average speed is 120.

Short Ballot. A feature of modern electoral reform is the "Short Ballot," under which only the more important public offices are filled by election, other offices being filled by appointment, the officials thus chosen being held responsible for the conduct of those whom they appoint. Many states have direct primary laws under which candidates are nominated directly by the people. Under this system the names of all candidates whose petitions are signed by a certain percentage of the party voters are placed on the ballot. The primaries are conducted by the regular election officials at the usual polling places and at the public expense.

Shoshone (*shō-shō′nē*) **Falls,** a cataract on Snake River in southern Idaho. The river runs through a deep gorge between walls of rock 1,000 feet high. The head of the falls is in the shape of a semicircle, from which the water leaps 210 feet in a sheet 950 feet wide. Niagara falls less than 170 feet. Little Shoshone Falls are two cataracts separated by a great rock, with a fall of 182 feet, about four miles higher up the river.

Shoshones or **Snakes,** a family of American Indians, which includes the Utes, Comanches and several other tribes. They have been known by various names, as Buffalo-Eaters, Sheep-Eaters and White Knives. They were found by Lewis and Clark beyond the Rocky Mountains in 1805. Their homes were in the valleys of Snake River, Humboldt River and Great Salt Lake. They have usually been peaceful, having little intercourse with the whites. From 1849 to 1862 there were battles and skirmishes with the advancing settlers, treaties made and broken by the government, until in 1867 they made peace at Fort Bridger and were settled on reservations in Idaho, Wyoming, Nevada and Utah. They number about 6,000.

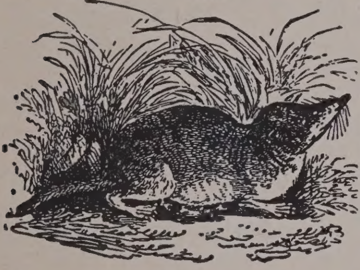
Shot is the name given to all solid projectiles, *i. e.*, anything thrown out or fired from any kind of firearms. The shot used for cannon and machine-guns are made of cast iron or steel and formerly were solid balls. Balls weighing more than three pounds are not now made solid. Bar-shot were two discs of iron joined by a bar, used to destroy the rigging of a ship; chain-shot, used in the same way, were two round shot fastened together by a chain. Canister or case-shot is a tin cylinder filled with bullets. Grape-shot was a number of small, iron balls held together by canvas or iron plates, but is no longer used. Small shot, used in hunting, is made of lead in various sizes, from that of large peas to dust-shot. The melted lead is dropped from a height through a colander into water. The lead falls in small drops through the holes of the colander, the shot varying with the size of the holes. The fall through the air cools and hardens the lead before it falls into the water. Shot-towers are from 100 feet to 150 feet high; the highest shot-tower is in Austria and is 249 feet high. The shot is sifted in sieves to separate the different sizes, imperfect ones being discovered by rolling them down an inclined plank, and is finally polished. See Cannon, Projectiles and Shell.

Shotgun. A light, smooth-bored gun for sporting purposes, in contradistinction from the military rifle. It is especially designed for firing a number of small shot at short range to kill small game. Shotguns formerly were double-barreled, but now more commonly obtain rapid fire by means of a revolving cylinder or other device. The present perfection in the mechanism and efficiency of the shotgun is due to many inventions in France, England and America. For a long time the best were of English manufacture, but it is now generally conceded that the American weapons have preëminence. See Arms, Gun and Rifle.

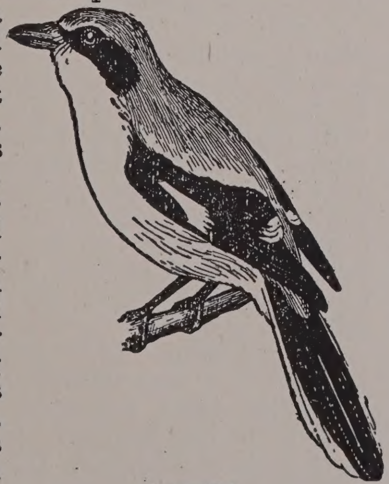
Showers of Fishes, a curious phenomenon most common in tropical regions. It is explained by a strong draft upward in the center of a whirling column of air, which sucks up the fish from the water and carries them through the air, dropping them at some distance from their homes. On the Isle of Mull herrings fell on a hill 1,500 feet from the sea and 500 feet above it. Sometimes the fishes are alive, but more often they are dead. Showers of frogs and of dead flies have also been noted.

Shreve′port, parish seat of Caddo Parish, La., 170 miles east of Dallas, is at the head of navigation on the Red River. Eleven railway lines run into it, and it is surrounded by a region rich in gas and oil that also produces cotton, lumber, and live stock. Shreveport is the largest fertilizer center west of the Mississippi and has one of the largest Building and Loan associations in the South, as well as a big wholesale trade. The city is governed by a commission council of four. It was settled in 1833, and incorporated in 1839. Population, 47,000.

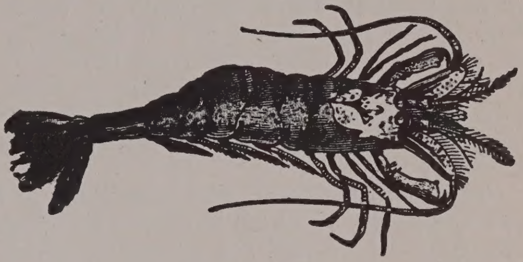
Shrew, an insect-eating animal having the general appearance of a mouse, but belonging to quite a different order. The mice are gnawers, the shrews are insect-eaters and related to the moles. They have a sharp, pointed snout and jaws with numerous, sharp teeth. The eyes and ears are minute. They come out occasionally from their burrows, but seem very helpless above ground, and are exceedingly shy. They feed both day and night. They do not burrow deeply, their holes being under roots and in logs. They inhabit the Old and New Worlds, living in fields and open woods. Besides insects they eat worms and mollusks. Water-shrews exist also in North America and in Europe.


COMMON SHREW

Shrike, a song-bird found in all parts of the world except South America. Shrikes, besides eating insects, prey upon field-mice and small birds, capturing them with their bills and not with their talons. Owing to the weakness of their feet, their prey is impaled on thorns, and this habit has gained for shrikes the name of butcher-birds. There are about 200 species, but only two in the United States. The great northern shrike, which is a winter visitor, is a little above ten inches long, gray above with a black and white tail and whitish undersurface with black bars. It nests in the arctic circle, but is seen from October to April as far south as Virginia. The loggerhead shrike is common in the Mississippi valley, central New York, Vermont and Maine. It is about none inches long and colored like the great northern shrike, except that there are no black bars on the breast. Its song is rather unmusical.


SHRIKE

Shrimp, small, slender and long-tailed crustacea inhabiting salt water. The prawns are closely related and are commonly served in shrimp-salad. These animals are all small, in general form resembling a lobster or crayfish. Some are nearly transparent. They live on the sand in salt water. They are taken in great numbers for food, especially in England and in France.


SHRIMP

Siam (*sī-ăm′*), **Gulf of,** an arm of the China Sea, south of Siam and west of Cochin-China. It is 245 miles wide at its entrance, and extends inland for 390 miles.

Siam, Kingdom of, in the Indo-Chinese peninsula, is a country whose limits have varied much at different periods of its history, most of the border-lands being occupied by tribes more or less independent. By the treaty of September, 1893, Mekong River was made the boundary between Siam and the French possessions; but in January, 1896, the British and French governments came to an agreement by which France appropriated the territory of 100,000 square miles lying between the Mekong and the Anam hills, thus leaving to Siam a territory of 220,000 square miles. Negotiations have been in progress recently for a new British-Siamese treaty, which will modify British extraterritorial rights in Siam and cede the Siamese tributary states of Kelartan and Tringaur to Great Britain.

Surface and Drainage. The plain of the Menam valley and the Korat tableland, from 400 to 1,000 feet high, form the larger part of the country. The Menam, 600 miles long, is the principal river, but the bar at its mouth prevents ships of more than 13 feet draught from ascending to Bangkok. Mekhong or Cambodia River is partly within the territory, and forms a large part of the boundary on the north and the east, but is of little use for navigation being obstructed by falls and rapids. Many canals have been cut, for transportation has been almost entirely by water.

Natural Resources. Gold has been found from the earliest ages, and the mines are now worked by European speculators. Other important minerals include coal, tungsten, zinc, manganese, lead, antimony, molybdenum, copper, tin, iron, rubies and sapphires. Much of upper Siam is a dense forest, including such woods as mangosteen, teak, rosewood, palms, aloes and sappan. The fisheries also are quite extensive, and birds of brilliant plumage and sweet song abound. The animals are those of the tropical regions, the elephant being tamed and used for labor in the teak forests. Some of the famous white elephants of Siam are kept in the royal courtyard at Bangkok, but are not held sacred or fed from golden dishes as the stories assert. The climate is healthful with two seasons, the wet and the dry, and a rainfall of fifty-four inches. April is the hottest month of the year.

People and Culture. The population in 1929 was 11,506,207, of which number 10,493,304 are pure Siamese. There are 445,274 Chinese, besides Burmese, Malays, Cambodians and the Laos or Shans. The Siamese are a small, well-shaped, olive skinned and black-haired people. They are peaceful, vain, social and lazy, fond of bright colors and jewelry. The children's heads are shaved, except a tuft on the crown, which is cut off with great ceremony when they attain maturity. Their houses are built of wood thatched with palm leaves, and stand on piles. The banks of the rivers are often lined with wooden houses floating on rafts or bundles of bamboo. The food consists mainly of rice, fish and fruit. A liquor made from rice is used as a drink, but there is very little drunkenness among the inhabitants. Betelnut-chewing and tobacco-smoking are almost universal, the teeth being colored black by the nut and other materials used for the purpose. The religion is Buddhism, and all the Siamese enter the priesthood for a time. The temples are numerous, with guilded minarets, roofs of colored tiles and quaint pagodas.

Production and Industry. Large tracts of waste land, sufficient to accommodate 250,000 people, have been opened by irrigation. The project is being completed by sections, one being finished in 1922 and one in 1931. One irrigation company has connected the Menam and Bangkapong Rivers and is building numerous smaller canals. Chinese coolies perform the major part of the labor in field, mill and mine, while forest-labor is performed by Burmese, Karens and Khamus. The chief product is rice of which 4,036,238 tons were produced in 1932. There are seventy-five large rice-mills and about 700 smaller ones. Other products include tobacco, coffee, hemp, cotton, fruits, coconuts, salt, pepper, dried fish and cattle. Rubber is collected and exported. Teak-cutting is also an important industry, but it is almost entirely in the hands of the British. Manufactures are not as yet extensively developed, only coarse cloth and silk, rough paper, water-jars and tiles are made.

Government. Siam until June 24, 1932, was an absolute monarchy. On that date there occurred a revolt of the army, resulting in the seizure of the king and his family. On June 27, of that year a Siam Temporary Constitution was drawn up and King Prajadhipok, who ascended the throne in 1925, was invited to rule as constitutional monarch. The king of Siam is now Head of the State, but the supreme power rests with the nation. The executive power is in the hands of a Committee of fifteen members of the "People's Party," who are selected from a deliberative and legislative body known as the "People's Senate." In April, 1933, the king made known his dissatisfaction with the communistic economic plans of the State Council under the leadership of Luan Pradt who had acted as the civilian instigator of the 1932 revolt. King Prajadhipok replaced the members of that Council with a new group under the leadership of Phya Manopakarana and other ministers of the old cabinet. Communism was also declared a menace to the State and the spreading of its propaganda punishable by a fine and ten years imprisonment. In the absence of the King from Bangkok, however, the Commander-in-Chief of the Army, Colonel Phya Bahol Bolabayuha, executed a second *coup d'etat* on June 20, 1933, and formed a new government, which, with its reform program, was accepted by King Prajadhipok.

The kingdom is divided into ten *Monthons* (circles), nine of which have a Lord-Lieutenant. These *Monthons* are divided into sixty-nine *Changwats* (provinces), which are in charge of subordinate governors under the Lord-Lieutenants. The *Monthon of Krungdeb* (Bangkok) is administered by a Lord Prefect. Each *Monthon* is further divided into *Ampurs* (districts), *King-Ampurs* (sub-districts), and *Tambons* (communes).

Education. The educational program of Siam is making distinct progress. Elementary education is compulsory except in the capital. In 1930 there were 267 government schools, with 39,401 pupils and 1,862 teachers, under the control of an English chief-inspector. There were in addition 5,201 local elementary schools, and 969 private schools. There are thirty-one training schools for teachers, one medical college, and agricultural and railway schools. The Chulalankarana University was founded at Bangkok in 1917.

Transportation. In 1932 there were in Siam 1,842 miles of state railways open to traffic and 104 miles under construction, and sixty-six miles of private railways. In 1931 there were 1,423 miles of highway. Telegraph and postal service is extensive, and civil aviation followed routes 384 miles long in 1932.

History. Siamese history dates from the year 1350. Cambodia was conquered and made tributary in 1532 and the present dynasty was founded in 1782. Ayuthia was the capital until it was burnt by the Burmese after a siege of two years in 1768. Bangkok was made the capital by Phya Tak, who drove the Burmese from the country and became king. In 1891 the boundary between Siam and British Burma was settled by treaty. Further treaties in 1893, 1904, 1907 and 1909 established Siamese boundaries and territories, settling disputes with Great Britain and France. In July, 1917, Siam declared war on Germany and Austria-Hungary. A military contingent was sent to France in 1918. Siam was represented at the Versailles Peace Conference and signed the Peace Treaty. The country is a member of the League of Nations and the World Court. In April, 1931, King Prajadhipok came to the United States with his queen to have a cataract removed from his eye, which was done successfully. In commemoration of the sesquicentennial of the founding of the Chakri dynasty, he ordered 3,000 prisoners set free in Siam by April, 1932.

Siam, as other countries of the world, has experienced the difficulties which have attended the world-wide economic depression since 1929. The kingdom has been confronted by a financial as well as a governmental breakdown. On October 13, 1933, Prince Bavaradaj, a cousin of the king and former War Minister, instigated a rebellion which reached the outskirts of Bangkok before it was successfully suppressed by Government troops. One of the most unusual features of this revolt was the spectacular airplane fighting which occurred. King Prajadhipok and Queen Rambaibarni remained secure at Huahin, a seashore resort far from the scene of the outbreak. The major difficulties confronting Siam are being fanned into greater fury by the principles of communism which are proving to be of such potent influence on the character of the discontented Orientals.

Siamese (*sī-ȧ-mēz'*), **Twins,** the name of two children, Eng and Chang, who were born in Siam in 1811. They were united by a band of flesh composed of peritoneal and hepatic tissues, growing from chest to chest situated between the xiphisterna and umbilici. They were exhibited as curiosities in the principal cities of Europe and America, and finally settled in North Carolina, where they married two sisters. The Civil War ruined them financially, and they again made the tour of Europe, exhibiting themselves in 1869. They died in North Carolina, two hours and a half apart, at the age of sixty on January 17, 1874.

Sian (*sē'än*) or **Sianfu** (*sē'än-fōō'*), or **Singan** (*sē-n-gän'*), formerly Chang-an, the capital of the province Shensi in China, is situated in the northwestern part of China, on a lofty plateau a few miles south of the Wei River, about 250 miles west of Honanfu. The Wei is the chief tributary of the great Hoangho or Yellow River. Sian is surrounded by great walls thirty feet high and nearly twelve miles in circumference, pierced by four gates with a tower over each. The Manchu quarter, in the northeastern section of the city, contains a large tract of land within walls, the site of the ancient imperial palace. The Mohammedans dwell in the northwestern section, which contains the oldest mosque in all China. The Yamen of the governor, and a large residential section, occupy the southwestern section. In the southeastern corner of the city is the "Peilin," a priceless collection of ancient carved tablets.

Sian possesses a fascinating history. It has had many and various names. During the time of the Chow dynasty in 1100 B. C. it was the capital of China. During the seventh and eighth centuries of the Christian era, Sian became a center of Christian missions and Nestorian influence. In 781 was erected the celebrated Nestorian Tablet, which included among its inscriptions a vague summary of the Christian doctrine of the times. This tablet was discovered by accident in 1625, and restored on a stone base. In 1907, Frits Vilhelm Holm, a Danish explorer, secured a monolith replica of the Nestorian Tablet. This was on exhibition in the Metropolitan Museum of New York from 1908 until 1916. Later it was placed in the Lateran Palace in Rome. In 1900, during the Boxer Rebellion, the Empress Dowager Tze-Hsi and the Emporer Kwang-Hsu fled from Peking, and established a temporary capital in Sian. The city joined the revolt against the Manchus in 1911.

Sibelius (*sē-bā'lĭ-ŭs*), **Jean, a** distinguished Finnish composer, was born in Tavastehus Finland, in 1865. He studied music in Helsingfors, Berlin and Vienna. In 1893 he returned to Finland, where he became principal of the Helsingfors Conservatorium. His time, however, was chiefly devoted to composition. He toured Scandinavia, Germany, France and Belgium in 1900. Fourteen years later he came to America to produce his *Daughters of the Ocean* at the festival held at Norfolk, Connecticut. His compositions are characterized by a marked individuality and the deep influence of his native folk-music. His most important works include a number of *Symphonies; The Swan of Tuonela; Overture* and *Suite of Karelia; Finlandia;* the opera *The Maid in The Tower*, and *Pohjola's Daughter.*

Siberia (*sī-bē'rĭ-ȧ*), now a part of the Union of Soviet Socialist Republics, is situated in northern Asia. It covers 4,786,730 square miles, stretching from the Chinese Empire to the Arctic Ocean.

Surface. A large part of Siberia is only imperfectly known. It is covered with a network of highlands and mountain-ridges, of which the Great Altai and Sayan Mountains, separating Siberia from Mongolia; the Barguzin and South Muya ridges, with others still unnamed; and the Stanovoi Mountains, which form a high wall on the coast of the Sea of Okhotsk, are the most important. Some of the peaks of the Altai Mountains and a few others rise into the region of perpetual snow. A belt of forests on the northwestern border of the central plain and, beyond that, another belt of high plains 500 miles wide, 1,700 to 2,500 feet high and most of it very fertile, end in an immense lowland stretching to the shores of the Arctic Ocean. These lands in western Siberia are very fertile, are the granary of Siberia, and contain one third of the population. Between Obi and Irtish Rivers are great marshes, which can be crossed only when frozen; and, farther north still, come the *tundras* (salt prairies and frozen swamps), where the ground is frozen hundreds of feet deep and thaws only on its surface in the summer. Trees disappear, only a few low bushes and a few flowering plants surviving the cold. Yet 50,000 human beings call this region home, and wander over it with sledges drawn by reindeer and dogs. In southeastern Siberia, in the Amur province, are high plains, covered with oak forests and rapidly filling with emigrants from Russia; while there are fertile tracts on the frontier of Korea and a splendid harbor at Vladivostok on Peter the Great Gulf.

Drainage and Climate. Great rivers — the Obi, Yenisei, Irtish, Lena and Amur, being some of them — greatly assist internal communication in this great country, and four lines of railroad have already entered Siberia on the west, one of which, the trans-Siberian line (*q. v.*) opened in 1899, established uninterrupted steam-communication through the Russian empire. Siberia is the coldest country in the world. Yet the summers are much warmer than is usually supposed; melons grow in the open air in some parts, and barley sown in May will ripen by August. The summers, however, are short, and by November all the rivers are frozen, and in the extreme north the thermometer has recorded 75° below zero. The air is very dry and there is no wind, which makes the cold more endurable.

Inhabitants. Siberia had a population of 8,220,100, January 1, 1910, according to the Russian Statistical Committee. These figures include native Siberians, Koreans, Manchurians, Chinese and about 90,000 Russian immigrants each year. The Russians belong to the Greek church; the Turkish tribes are Mohammedans; while others are Buddhists.

Natural Resources. Siberia is rich in minerals, but mining is undeveloped; gold, silver, lead, copper and iron are mined, however, in considerable quantities, a profitable trade in timber is carried on, and the coal-mines yield over five million tons annually.

Occupations. The chief occupations are farming and cattle-breeding. In a single year 11 million acres were in meadow-land, 9,773,000 in cereal crops and 171,000 in potatoes. The wheat-crop in 1910 was 45,000,000 bushels; the oat-crop of Asiatic Russia 79,743,000 bushels, the larger part coming from Siberia. The live-stock industry is quite valuable, and horses, cattle, sheep and pigs are raised in considerable numbers. Hunting is profitable for the valuable furs of the sable, ermine, gray and white foxes; and fishing is carried on extensively.

Manufactures. Government factories are operated in some of the larger towns, and porcelain, hardware, leather and earthenware are among the products. Extensive woolen and linen factories are among the industries. In Asiatic Russia there are 8,005 miles of railroad. There are 339 schools, supported in the main by local authorities, with 773 teachers and 43,786 pupils.

History. The earliest inhabitants are by some writers called Yeniseians, who were followed by a race of considerable skill, judging from their relics found in mounds. Turks conquered the country in the 11th century, and were themselves conquered by the Mongols two centuries later. Russians first invaded the region in 1580, by a band of Cossack robbers, followed for two centuries by other bands of Cossacks, traders, hunters, dissenters flying from religious persecution and peasants escaping from serfdom. In the first 80 years the Cossacks had reached the Sea of Okhotsk, but Russia's possession was not acknowledged by China before 1857. Bering Strait was discovered in 1648 by Dejnef, the Cossack, who sailed around the northeastern end of Asia; but, as his discovery was not made known, the honor still belongs to Bering. Consult Lansdell's *Through Siberia;* Kennan's *Tent-Life* and *Siberia and the Exile System;* and Dewindt's *The New Siberia.*

Sibe'rian Railroad. The building of this road was begun in 1891 and was completed in its main features in 11 years, including a branch across Manchuria to Port Arthur and Dalny. It starts from Tchelyabinsk on the eastern slope of the Urals, and extends to Vladivostok on the Pacific, a distance of 4,500 miles, following the fiftieth parallel. This is the main division of the railroad. The great Russian system which connects Petrograd, Port Arthur and Vladivostok measures 6,672 miles. The first work on the real road was done on May 1, 1891. In perfecting the enterprise Russia sent commissioners to the United States to study American railroad-systems; imported Italian workmen who had helped to build the Simplon and St. Gothard tunnels; built towns in deserts; and transported whole families by the thousands to them for their work. Many serious obstacles had to be overcome far from the base of supplies. Lake Baikal was a great barrier; steamers transported the cars in summer, and ice-breaking steamers were used for a part of the long winter. The line was completed, however, by the building of a 100-mile detour around the southern end of the lake in 1904. The road was built cheaply, with light rails and wooden bridges, but, when formally opened in 1902, had cost $172,525,000. It has proved a good investment, having given an impetus to agriculture and all other business of Siberia. Branches from the main line are projected, chiefly to the northern portion of Asiatic Russia. In 1906, by Russian official statistics, this road carried 162,000,000 pounds of freight and 2,097,000 passengers. Great quantities of wheat and tea are carried, the tea being brought by caravan from China. This line is of great military and political importance. In 1904 Russia dispatched over 300,000 troops over it in 90 days, with enormous quantities of provisions and supplies.

Sibyl (*sĭb'ĭl*), a name given to certain inspired prophetesses in the classic period. Their number varies, but is generally fixed at ten, of whom the most celebrated was the Cumæan, who is mentioned, in the sixth book of the *Æneid* as leading Vergil into the lower world. According to Livy she came from the east to King Tarquin, offering nine books of prophecies but at so enormous a price that he refused to buy. She then destroyed three, and, returning, offered the remaining six at the same price, and was again refused; destroying still another three, she asked as much for the three left, which Tarquin's curiosity finally induced him to buy. They contained advice regarding the religion and government of the Romans, and were carefully guarded in the temple of Jupiter until 83 B. C., when the temple was burned. A new collection was made of about 1,000 lines, gathered from all the cities of Greece, Italy and Asia Minor, which was kept until some time between A. D. 404 and 408, when it was publicly burned. The Sibylline oracles written in Greek, in 14 books containing 4,000 lines, are entirely distinct, being a series of pretended predictions written by Alexandrine Jews and Christians.

Sicil'ian Ves'pers, the name given to the massacre of the French in Sicily, March 30, 1282, the first stroke of the vesper-bell being the signal for slaughter. Charles of Anjou, brother of Louis IX of France, had conquered Naples and Sicily, but was hated by his Sicilian subjects for his cruelty and injustice. The inhabitants of Palermo at that signal rose against their French oppressors, killing men, women and children to the number of 8,000, an example followed throughout the island, where the French were hunted like wild beasts. The 600th anniversary of the Sicilian Vespers was celebrated in 1882. Consult Amari's *War of the Sicilian Vespers*, translated by the earl of Ellesmere.

Sic'ily, the largest island in the Mediterranean, is the most populous and the most fertile. It lies off Italy, separated by the Strait of Messina, two miles wide.

Area and Surface. It covers 9,935 square miles and is shaped like a triangle. Sicily is a plain, 500 to 1,900 feet above the sea, crossed in the northern part by a chain of mountains, the loftiest peak being 6,467 feet high. From the center of the chain a range branches off, going through the heart of the island to the southeast. The lower mountain-slopes are usually covered with groves of oranges and olives, and the plain with fields of wheat. Mt. Etna rises from the vineclad plain of Catania, 10,850 feet, with a base of 400 square miles. The climate is warm except in the mountain-regions.

Natural Resources. Magnificent forests of oak, ilex, beeches, chestnuts and pine are still found, though many have been recklessly destroyed. Dates, figs, almonds, lemons, olives, pomegranates and grapes are very abundant. The wheat of Sicily is one seventh that of all Italy, and the barley one half of the crop of the kingdom. The only mineral product is sulphur, of which there are some 300 mines. Sardine-fisheries employ a large number of persons.

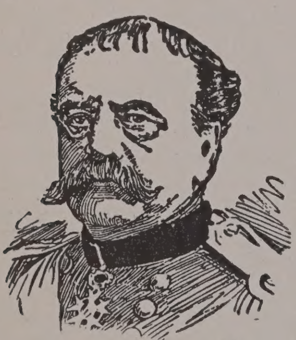
Industry. It manufactures two thirds of the wine of Italy, and exports a large amount of sumac for tanning. Manufactures, however, are few — mainly cement, crockery, gloves, macaroni, soap, some silk, cotton, woolen and linen goods; glass, oilcloths and leather are produced. Rapid progress is being made in railroad-building, and 500 miles are in operation.

People. The population numbers 3,683,380. The people are devout but superstitious, and three fourths of them cannot read. Elementary education is compulsory however, for children between six and nine; and, though this law is by no means strictly enforced, school-attendance is steadily increasing.

History. There were early Phœnician settlements, but the real settlers were Greek colonists who founded cities on the eastern and southern coasts from 735 to 579 B. C. The first struggle with Carthage, which ended for 70 years by the great victory at Himera over Hamilcar in 480, was followed by a Phoenician invasion under Hannibal (not the great Hannibal), but Dionysius the Tyrant checked the Carthaginian conquests. In 210 B. C. the island became a Roman province. It was conquered by the Vandals in 440 A. D., ceded to Theodoric, and regained by Belisarius (535). The Saracen occupation, dating from 827, lasted until the Normans took possession in struggles lasting from 1038 to 1090. The Norman, Roger, Count of Sicily, in 1130 took the title of King of Sicily and Italy. In 1194 the crown went by marriage to the German emperor until 1264, when Pope Urban IV, a Frenchman, gave Sicily to Charles, Count of Anjou. Manfred, the last native ruler, died fighting against the invader, and his son-in-law, Peter of Aragon, continued the contest, ending with the crowning of his son, Frederick, in 1296. The contests of France and Spain for Sicily and Italy continued, and in 1502 Ferdinand of Aragon defeated the French at Mola and became king of Naples and Sicily. The peace of Utrecht (1713) gave Sicily to the duke of Savoy, who in 1720 exchanged it with Charles VI of Austria for Sardinia, but in 1738 Don Carlos of Spain was king of the Two Sicilies. The Bonaparte rule began with the taking of Naples in 1798, lasting until 1808, when Ferdinand IV was allowed to remain king of Sicily, afterwards taking by the treaty of Paris his old kingdom of the Two Sicilies. At last, on May 11, 1860, Garibaldi, with his thousand heroes, took Palermo and entered Naples in triumph, and the people by popular vote joined themselves to the Sardinian kingdom. The chief cities of Sicily are Palermo (population 309,694), Messina (149,778) and Catania (149,295).

The Two Sicilies, a kingdom of southern Italy, included Sicily, several smaller islands and the kingdom of Naples. Consult E. A. Freeman's *History of Sicily*; his shorter history in the Story of the Nations Series; and Frances Elliot's *Diary of an Idle Woman*.

Sick'les, Daniel Edgar, an American general, was born at New York, Oct. 20, 1825. In 1847 he was sent to the legislature, and in 1853 went to England as secretary of legation, and in 1856 became a member of Congress. When the Civil War broke out, he was made colonel of a regiment he had raised in New York, and as brigadier-general commanded in the battles of Chickahominy. At Antietam and Fredericksburg he commanded Hooker's division of the 3d corps, and with the rank of major-general served at the head of the 3d corps at the battles of Chancellorsville and Gettysburg. After the war he was commander of the military district of North and South Carolina until 1867, and in 1869 was appointed minister to Spain. In 1892 he was elected to Congress. He died in 1914.



GENERAL SICKLES

Sidd'ons, Sarah (Kemble), the great tragic actress of England, was born at Brecon, Wales, July 5, 1755. Her father was the manager of a small, traveling, theatrical company, and she took part in the performances from earliest childhood, and at 17 married Siddons, a member of the company. Her first appearance at Drury Lane, Dec. 29, 1775, in the character of Portia was a failure, and for six years her acting was confined to the provinces. In 1782 she reappeared in London as Isabella in *The Fatal Marriage*, and was the queen of the English stage from that time until, as Lady Macbeth, she took leave of it, June 29, 1812. She gave public readings from Shakespeare and Milton, and appeared occasionally for charitable objects after leaving the stage. She died at London, June 8, 1831. See *Life*, by Mrs. Kennard, in the Eminent Women Series.

Sid'ney, Sir **Philip,** an English courtier and writer, was born on Nov. 29, 1554, at Penshurst in Kent. He studied at Oxford, finishing his education, after the fashion of the day, by travel in France, Germany and Italy. Leicester, his uncle, being all-powerful at the court of Elizabeth, Sidney at once began his public life. He was sent as ambassador to Rudolph II of Austria and then to William, Prince of Orange. At first a favorite of the queen, he lost her influence by his defense of his father against her ingratitude and by his opposition to her proposed marriage with the Duke of Anjou. In 1580 he retired from court, living with Lady Pembroke, his sister, where he probably wrote his *Arcadia*. His associations with Spenser and perhaps the circulation of his writings in manuscript had already given him a wide reputation, which was well-sustained by *Arcadia*, written in 1578–80, which appeared in 1590 and for a century retained its great popularity. It is a pastoral romance written in poetical prose. Though not free from the "conceits" of the age, still is well-worth reading. His *Apology for Poetry* (*Defense of Poesy*), written about 1580, displays vast reading, and, while criticising severely the crowd of common versifiers, names as the best English poets Chaucer, Sackville, Surrey and his friend, Spenser. His own poems, *Astrophel and Stella*, a series of 108 sonnets and 11 songs, were inspired by his love for Penelope, a daughter of Lord Essex, and place him near Chaucer. He returned to court, was knighted, and in 1583 received from Elizabeth a grant of 30,000,000 acres in "certain parts of America not yet discovered," and planned to accompany Drake to America. He was ordered, however, to go with Leicester to the Netherlands, where, after a brilliant exploit in a chivalrous conflict, he was fatally wounded under the walls of Zutphen, Oct. 2, 1586. Faint from the loss of blood, he called for a drink, but, seeing a poor soldier carried by, looking longingly at the water, he handed the cup to him, saying: "Thy necessity is greater than mine." See *Life* by Symonds in the English Men of Letters Series.

Si′don, an ancient city of Phœnicia, on the eastern coast of the Mediterranean, about half-way between Tyre and Beirut. It held the first position among the cities of Phœnicia, so that it sometimes gave its name to the whole region. Its colonies were found throughout the ancient world, and its commerce was very large. Its manufactures of linen, glass, purple dyes and perfumes were sources of great wealth. Even under Assyrian, Chaldean and Persian rule it retained its importance, reaching its highest prosperity under the Persians. An unsuccessful revolt in 351 B. C. involved it in temporary ruin, from which it recovered speedily. In 333 B. C. Alexander the Great conquered it, and it fell in succession into the hands of Syrians, Greeks and Romans, and in the middle ages was taken by crusaders. The present town, called Saida, has 10,500 inhabitants.

Siemens (*sē′mĕnz*), **Ernst Werner von,** a German electrician, was born at Hannover, Dec. 13, 1816. In 1831 he took out his first patent for galvanic silver and gold plating. His work in connection with the telegraphic system of Prussia resulted in the discovery of the powers of gutta-percha in insulating underground and marine cables. He is known as one of the discoverers of the self-acting dynamo. With his brothers he established large houses for the making of electrical apparatus in Berlin, St. Petersburg, London, Vienna, Tiflis and, in 1892, in Chicago. His scientific papers were collected and published in 1881. He was one of the foremost electricians of the day, sharing with his brothers in many inventions. He died at Berlin, Dec. 6, 1892.

Siemens, Sir **William,** the German scientist, was born near Hannover, April 4, 1823 He studied at Göttingen. giving special attention to science. After two visits to England in the interests of his brother's inventions, he made England his home in 1844 and became a British subject in 1859. As manager of the house of Siemens Brothers. he was engaged in constructing telegraph-lines. the steamship *Faraday* being designed by him for cable-laying. He also built electric railroads. The principle of his "regenerative" furnace has been applied in many ways, but especially by himself in the manufacture of steel. He invented a water meter, a bathometer for measuring ocean-depths, an electrical thermometer and a process of hastening the growth of plants by electric light. In 1874 the royal Albert medal and in 1875 the Bessemer medal were given him in recognition of his inventions. He was president of the three principal telegraphic societies of Great Britain and of the British Association, and in 1883 was knighted. He died at London, Nov. 19, 1883. See *Life* by Pole.

Siena (*sē̇-ä′nȧ*), a city of Italy in the center of Tuscany, about 60 miles south of Florence. It is a walled city, with narrow, winding streets. The cathedral, begun in the 13th century, is one of the finest Gothic churches in Italy, with a wonderful eight-sided pulpit, a fine mosaic-floor, a series of frescos of scenes in the life of Pope Pius II and a font with bas-reliefs by Donatello and other sculptors. The church of St. Catherine, the fountain of Fontebranda, celebrated by Dante, the palace and its high tower, the university, founded in 1300, and the Institute of Fine Arts are among the attractions. There are manufactures of silk, cloth and hats and a trade in wine and olive-oil Siena, a Roman colony, became a free republic at the breaking up of the empire, and was the head of the Ghibelline towns in central Italy, being a rival of Florence. In 1399, to protect themselves from Florence, the Sienese placed themselves under the duke of Milan, and in 1524, to escape the usurpations of the Petrucci family, they became tributary to Emperor Charles V, who afterwards gave Siena to Cosmo de Medici, and it became a part of Tuscany. It is the seat of a university with 31 professors and 231 students. Population 41,659.

Sienkiewicz (*shĕn-kyä′vĭch*), **Henryk,** Polish novelist, was born at Wola Okrzejska, in Lithuania, in 1846, and was educated at the University of Warsaw. Early in his career, having espoused journalism, he devoted himself to literature, and soon won a high position as a novelist and short-story writer. In 1876 he came to the United States, and for a time in company with Madame Modjeska, his countrywoman. he resided in California, where he designed to establish a Polish colony. In 1880 he wrote *Tartar Slavery*, following this, a few years later, by his masterly novel, *With Fire and Sword.* To this succeeded *The Deluge, Pan Michael, Without Dogma, Children of the Soil, The Knights of the Cross* and *On the Field of Glory* — all remarkable for vigor of characterization, historical truth and power of psychological analysis. In 1895 appeared his masterpiece, *Quo Vadis?* — a tale of the time of Nero (*q. v.*), written with remarkable vigor and powerful effect. He died in 1916.

Sierra Leone (*sĭ-ĕr′rȧ lē̇-ō′nē̇*), a British colony on the western coast of Africa, founded in 1807 and southeast of French Guinea. It lies north of Liberia, with 180 miles of coast, and, stretching toward the interior, covers about 4,000 square miles. The name is sometimes confined to the peninsula south of Sierra Leone Inlet, which is 26 miles long, rising to 3,000 feet in Sugar-

Loaf Mountain. The climate is hot and moist, and the lowlands malarious, giving it the name of the White Man's Grave. The people, numbering 76,655, are nearly all negroes, the white population numbering only 350. Agriculture and trading occupy about one fifth of the population, but the resources are not fully developed. Coffee, cocoa, tapioca, ginger, maize and cotton are grown, and there are a little boat-building, mat-making and cloth-weaving. The chief exports are kola-nuts, palm-oil and nuts and rubber; the chief imports, cotton-goods, tobacco and spirits. Freetown, the capital, the most important seaport in West Africa, is a fortified naval depot and a coaling-station. There are a university, founded by the Church Missionary Society, a savings-bank, a lunatic asylum and 65 schools, with an average attendance of 5,583 pupils. Sierra Leone (Lion Mountain) was discovered by Cintra, a Portuguese navigator, in 1462, and named from the heavy thunder roaring on its mountains. Attempts were made to colonize it with freed slaves in 1787 and 1791; the second effort being made under the Sierra Leone Company and supported by the arrival of 1,200 freed slaves from North America. In 1807 it was ceded by the company to the British crown. A railroad from Freetown extends 226 miles to Baiima near the Liberian frontier. Freetown has a telephone system; there are 221 miles of telegraph; and millions of dollars are being spent on railway extension and port works. The Sierra Leone protectorate, inland, covers 30,000 square miles and has nearly 1,000,000 inhabitants.

Sierra Madre (*sē-ĕr'rȧ mä'drā*), meaning Main Chain, a range of mountains in Mexico, stretching north into Arizona. The name sometimes includes the Cordilleras.

Sierra Morena (*mō-rā'nä*), a mountain ridge in the south of Spain, ranging from 2,000 to 5,500 feet in height. It has valuable mines of lead, silver, lignite and quicksilver; and is the scene of many of the incidents in *Don Quixote*.

Sierra Nevada (*nē-vä'dȧ*), Snowy Range, a mountain-range in southern Spain, crossing the province of Granada, about 60 miles long; Mulahacen, 11,600 feet high, is the highest point of the Spanish peninsula.

Sierra Nevada, a range of mountains in California 450 miles long, merging into the Coast Range. Mt. Whitney (14,886), Mt. Shasta (14,440) and Mt. Tyndall (14,386) are the highest peaks. The mountains are covered with forests, and gold and silver are found in large quantities.

Sierra Nevada, the name of two ranges in South America, both thought to be parts of the Andes. The mountains are wooded on the northern slopes, and naked rocks tower 6,300 feet on the southern side. Copper, silver, gold and coal are found The highest peaks are from 15,000 to 17,500 feet high.

Sieve= (*sĭv*) Vessels (in plants), often called sieve-tubes, the peculiar vessels characteristic of the bast or phloem portion of the vascular bundle. They usually are more or less elongated, and the name refers to the fact that their walls contain certain areas, known as sieve-plates, which are perforated by numerous openings, like the lid of a pepper-box. The sieve-vessels are prominently associated with the transfer of food.

Sieyés (*sē-ā'yâs'*), **Emanuel Joseph,** Count, known as Abbé Sieyès, a prominent figure in the French Revolution, was born at Fréjus, France, May 3, 1748. Entering the church, on account of his health, he became a canon and then chancellor and vicar-general. At the beginning of the struggles for liberty in France he published three pamphlets on political questions which made his name famous throughout France. He was elected a deputy in Paris, and it was on his motion that, when the nobles and clergy refused to join the deputies of the people, they declared themselves the National Assembly. The division of France into departments and the celebrated declaration of the Rights of Man were mainly his work. He voted for the king's death, but was opposed to a republic and to the excesses of the Revolution. Sent to Berlin, he secured the neutrality of Prussia. With Bonaparte he plotted the revolution of the 18th Brumaire (Nov. 9, 1799), ending in the consulate of Sieyès, Bonaparte and Ducos. His new ally, however, proved a master, and he resigned his consulship in disgust, though to propitiate him he was given the title of count, an estate and $120,000. He lived in Belgium during the Restoration, dying at Paris, June 20, 1836. Consult Lamartine's *History of the French Revolution.*

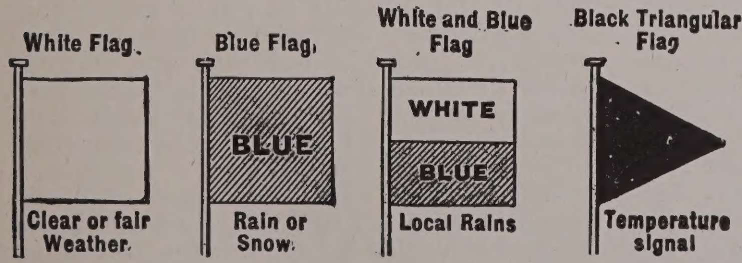
Sigel (*sē'gel*), **Franz,** an American general, was born in Germany in 1824. He was in the service of the grand-duke of Baden, and became minister of war in the Revolution of 1848, but was obliged to flee and came to the United States. He entered the army as colonel in 1861 during the Civil War, and by gallant service rose to the rank of major-general. He was elected registrar of New York City in 1871, and appointed United States pension-agent for the city in 1885. He died on Aug. 21, 1902.

Sigismund (*sĭj'ĭs-mŭnd*), Emperor of the Holy Roman Empire, was born on Feb. 14, 1361. When only 19, he became king of Hungary through his wife. He was terribly defeated in an expedition against the Turks at Nicopolis in 1396. Some years later he conquered Bosnia, Herzegovina and Servia. He became Emperor in 1411. His name is known by his failure to uphold the safe-conduct he had granted to Hus, and so allowing him to be burned by his enemies. His succession to the throne of Bohemia after his brother's death was opposed by the Hussites, and he only secured it after making concessions a year before his death, which took place on Dec. 9, 1437.

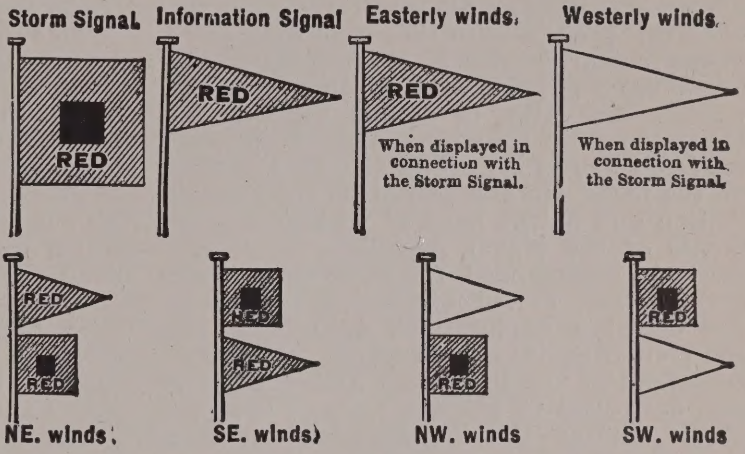
Sig′naling, any means of sending intelligence to a distance by sight or sound. The earliest signals in war were by means of torches and beacon-lights. Ships depend upon a system of flags, varying in arrangement, color and shape. What is known as *The International Code of Signals*, prepared in 1857, has been adopted by nearly all nations. It uses 18 flags, with which 78,000 different signals can be given, using no more than four flags at a time. The flags are blue, red, yellow or white, and square or long and pointed, called pennants. When a square flag is uppermost, it is a danger-signal. Some of the flags are used as letters, and so spell out words. At night, red, green and white lights are used instead of the colored flags, and ships in danger fire cannon and send off rockets. In fog, mist and snow-storms vessels at anchor ring a bell; a steamer moving blows its whistle; sailing-vessels use a horn, all at least once in every two minutes. The signals and their meaning are published in the signal-book, and copies are made in the different languages of the nations using the system.

Sig′nal-Ser′vice, United States. There are three authorized systems of signaling: those of the army, of the navy and of the weather-bureau.

In the army the value of a thorough system was readily seen. In 1860 an appropriation was made to introduce field-signaling under the charge of an officer with the rank of major. In 1863 the signal-corps was placed entirely in the care of a chief with the rank of colonel. In 1870 a meteorological division was added, and in 1891 this was transferred from the war to the agricultural department. There is a school of instruction in military signaling at Fort Riley, Kansas, where, in a course of six months, are given thorough knowledge of all the codes and the practical use of the various sorts of apparatus, consisting of flags, the heliograph, the field-telegraph and telephone trains, used by day; and torches, lanterns, rockets, bombs and search-lights, used by night. The code used in visual signaling is based upon the Morse system of dots and dashes.



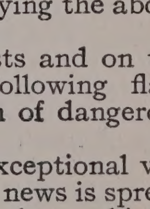
In the navy the *General Signal-Book* and the *Fleet Drill-Book* contain the code of day and night signals, so that, in order to send a certain message, it is necessary only to hoist flags representing the number of that message in the proper volume. At night, in place of flags, red and green fire-balls are shot into the air to serve the same purpose. For long-distance signaling electric lights are used, and it is even possible to signal a ship below the horizon by casting searchlights upon the clouds.



[*At night, red and white lanterns replace flags.*]

The weather-bureau has perfected a system of signals by which it can publish the weather-forecasts. Throughout the country are stationed agents who observe the indications of the weather and telegraph forecasts to thousands of towns and cities which then display the appropriate flag, chosen singly or in combination from among the preceding. Temperature is forecasted by placing a black flag *above* the weather-flag for higher, and *below* the weather-flag for lower, temperature. The approach of a cold wave is announced by displaying the above flag.

White Flag with black square in center



Along the seacoasts and on the Great Lakes the following flags signify the approach of dangerous winds:

When storms of exceptional violence are feared, the news is spread through the aid of rockets, whistles and other signals. The reports of the weather-bureau are given wide publicity, chiefly in the pages of the daily newspapers.

Sigourney (*sĭg′ẽr-nĭ*), **Lydia Huntley,** an American writer, was born at Norwich, Conn., Sept. 1, 1791. Her first publication was *Moral Pieces* (1815). She compiled books for the young, contributed to magazines and was one of the earliest women in America to enter authorship. She has been called the American Hemans. *Connecticut*, *Pocahontas*, *Tales* and *Letters to Young Ladies* are some of her books. She died at Hartford, June 10, 1865. Consult her autobiographic *Letters of Life.*

Sigs′bee, Charles Dwight, American naval officer, was born at Albany, N. Y., Jan. 16, 1845, and graduated in 1863 from the United States Naval Academy. In the Civil War he served in the West-Gulf squadron and was at the battle of Mobile Bay; in the North Atlantic squadron; and at both attacks on Fort Fisher and the final assault on the fort. He also served on the Chinese station and at the head of various departments of the Naval Academy. He successively commanded the *Kearsarge*, *Dale*, *Constellation*, *Portsmouth* and the *Blake* in the deep-sea explorations undertaken by the United States coast-survey. He was in command of the battleship *Maine* when it was destroyed in Havana harbor, Feb. 15, 1898. During the Spanish-American War he commanded the United States auxiliary cruiser *St. Paul* in operations against Cuba and Porto Rico, and later was transferred to the *Texas*. In 1904 he attained the rank of rear-admiral and in 1907 was placed on the retired list. He wrote *The Story of the Maine*—a personal narrative.

Sigurd (*zē′gōord*) or **Sigurdr** is the hero of the Norse Eddas. Thus he is identical with the Siegfried of the *Nibelungenlied*, which is modelled on the *Volsunga Saga*. Sigurd is a hero, a descendant of Odin, who slays the dragon that guards the golden treasure, and, by eating the heart of the monster, is enabled to understand the songs of birds. He also succeeds in penetrating the flames which surround the house of the sleeping Brunhild, whom he awakens. They plight their troth; and Sigurd rides away. Under the spell of a love-potion he marries Gudrun; and is also persuaded under a spell to deliver Brunhild for Gunnar. Brunhild now seeks to slay Sigurd; but her heart breaks for love of him when he is finally slain by the half-brother of Gunnar.

Sikhs (*sēks*), a religious sect in northern India. The word means followers or disciples. It was founded by Baba Nanak in the 15th century, who rejected the caste-system and idolatry, and taught the worship of one God. At the end of the 16th century the holy temple was built at Amritsar, which is the headquarters of the sect. As they increased in numbers, they gradually assumed military power, and in the 18th century under Ranjit Singh (*q. v.*), a young warlike chief, they became a great military force in the Panjab. He kept the treaty he had made with Great Britain, but at his death his large and well-drilled army invaded British territory in India in 1845. After several battles and defeats they were at last conquered in 1849, and the Panjab was annexed. At the mutiny (1857) the Sikhs remained loyal to England. The Sikhs form about six per cent. of the population of the Panjab, and there are 15 protected Sikh states connected with the Panjab government. They number about 1,907,836. Consult Cunningham's *History of the Sikhs.*

Silas Marner, a story of humble life by George Eliot (1861), considered by many her finest work. To quote her own words, "the story sets forth the good influences of pure, natural, human relations." Silas, the linen-weaver of Raveloe, wrongly accused of theft, leads an isolated, miserable life, his one treasure, the savings of years, being stolen by the squire's son. In its place a little child, Eppie, strays into his cottage and fills his life with joy. Her influence drew him into the stream of the village-life, and he became a natural man again. There is a minor theme in the life of Godfrey Cass, a type of the deterioration of character. This contrast with the regeneration of Silas Marner forms the center around which the author weaves much of the details of the simple village-life. The story is a good moral tonic aside from its specific teachings.

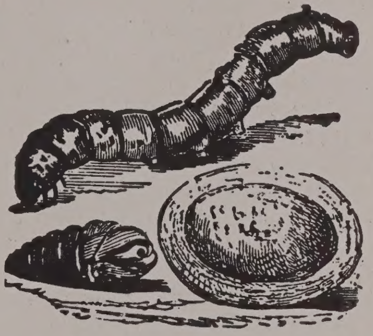
Silesia (*sĭ-lē′shĭ-ȧ*), a province in south-eastern Prussia, covering 15,566 square miles. It is crossed by Oder River and the Sudetic mountains, between which is a very fertile region, while on the northern and eastern sides of the Oder there are marshy and sandy tracts. One of the most productive coal-mining regions of Prussia, covering 530 square miles, is in the south-eastern corner of Silesia, and there also are mines of zinc. The crops are the usual cereals and flax, beet-root, chicory and hops. The manufactures are important, including linen, cotton and woolen goods, beet-root sugar, metal manufactures, glass and tobacco. The capital is Breslau. The population, including 820,000 Poles, 55,000 Bohemians and 32,000 Wends, numbers 5,225,962. All schools are under the direction of the minister of public instruction, and elementary education is free and compulsory. Silesia in the 10th century was under Polish rule; about the end of the 12th century it was divided into Upper and Lower Silesia; and by the beginning of the 14th it was separated into a number of small states under King John of Bohemia, which in 1526 fell to Austria. Austria and Prussia struggled for the country, the claim of Prussia being based upon a contract by which the duke of Leignitz in 1537 left his lands to the elector of Brandenburg in case he had no other heir. The three Silesian Wars (1740-42; 1744-45; and 1756-63 — the Seven Years War) ended in securing Silesia to Prussia, except the Austrian province of Silesia, a country south of Prussian Silesia, covering 1,987 square miles, rich in mines and with a population numbering 756,949.

Silica (*sĭl′ĭ-kȧ*), a compound of silicon and oxygen (SiO_2), is found in the pure state in the form of quartz or rock crystal. Flint, sandstone and chalcedony are nearly pure silica. It occurs also in combination in a large number of abundant minerals which are called silicates, and of which feldspar, mica, hornblende and clay are examples. Silica exists in many plants, particularly the grasses, in the quill-feathers of birds and in sponges. Most animals contain very little of it. Silicon, the nonmetallic element contained in silica, is never found in the free state. Although, next to oxygen, the most abundant element in the earth's crust, it is merely a chemical curiosity, being very difficult to separate from oxygen. Silica is largely used in making glass, and is an important constituent of porcelain, china, bricks etc.

Silicle (*sĭl′ĭ-k′l*), a short silique, the peculiar fruit of the mustard family. See Fruit.

Silique (*sĭl′ĭk*), the peculiar pod-like fruit of the mustard family, characterized by a false partition which runs lengthwise and divides the pod into two chambers. See Fruit.

Silk, the cloth and thread manufactured from the fiber obtained mostly from the cocoons of the silkworms. The making of silk probably originated in China, the wife of an emperor being credited with first unwinding a silk cocoon in 2600 B. C. The silkworms' eggs were brought to Constantinople from China about 552 by two Persian monks, who carried them in a hollow cane. They were successful in raising them and in introducing the manufacture of silk. The new industry spread through Greece, was carried into Sicily by prisoners of war, and brought to Spain by the Moors. Louis XI and Francis I imported workmen from Milan into France, and succeeded in starting the silk-manufacture after the cultivation of the mulberry tree for food for the worms had been established in 1564. In England silk-manufacture began under James I, but received a powerful impulse in 1685, when a large number of silk-weavers were driven to England by the Edict of Nantes. James I made an effort to introduce the industry into the American colonies, sending eggs to Virginia and offering rewards for their cultivation, but tobacco was more profitable. It was cultivated in South Carolina and Connecticut before the Revolutionary War. There have been several efforts to make the cultivation of the silkworm more general in the United States, one in California in 1854 and a Woman's Association formed in Philadelphia in 1876, but with no great result. The manufacture of silk is, however, carried on quite extensively, the center of the industry being Paterson, N. J., where there are more than 100 silk-factories France is the principal silk-making country. the British silk-trade having been much injured by the introduction of French goods free. The process of manufacture takes the raw silk, obtained from the cocoons of the worm, by winding it off through a reeling-machine; cleans, twists and doubles the threads; and winds them on bobbins and reels for the weaver. There is a considerable amount of waste in all the processes, which, known as waste silk, was for a long time considered useless, but in 1857 a method of spinning yarn out of this waste was invented by Lister of Bradford, England, which has added very much to the industry. The process of weaving silk from the prepared thread resembles that of weaving cotton or woolen goods.



SILK-WORM, LARVA, CHRYSALIS AND COCOON

Silk′worm, any larva or caterpillar which produces a silken cocoon used in the manufacture of silk. The name applies especially to the famous silkworm (*Bombyx mori*) that feeds on the mulberry tree. All silkworms are the larvæ of moths. Their eggs are laid to the number of 200 or 300 by a single individual. On hatching, the caterpillars go through several moults. They eat ravenously save just before moulting, and many die during the change of skin. Silkworms are subject to various diseases, great numbers being attacked by a fatal fungous disease. Constant care must be used in rearing them, and strict attention paid to cleanliness, ventilation and temperature. When they reach the fifth stage they eat enormously, and attain a length of three or three and one half inches. They now are naked, worm-like animals of a pale greenish color. About 36 days or more after hatching, they begin the formation of the cocoon, in which they undergo the transformations that convert them into moths. The cocoons are the source of the silk. They usually are white or yellowish and about an inch or more long and half as broad. The silk comes from a pair of long, tubular glands which open upon the lower lip of the animal. As the material of a spider's thread hardens on contact with the air, so this silk substance is formed into a delicate strand

While this is issuing from the orifice in the lower lip, the head of the worm is continually worked back and forth in such a manner that the thread is wound in spirals around the entire length of its body. There is formed in this manner one continuous thread of surprising length — being nearly four fifths of a mile long. The thread is matted together by a gummy substance. It is loosened in hot water, and the thread, united with those from four or five other cocoons, is unreeled. The process may occupy four days. There are several kinds of silk-producing larvæ, but all others are inferior to the mulberry silkworm. The *Ailantus* silkworm and the *Polyphemus* moth, with the larvæ of imported mulberry moths, are reared in America. The former feeds on oaks; the latter, the American silkworm, on the leaves of many different kinds of trees. There are various native silkworms. Many portions of the land would seem to be well adapted to silk-culture. China, Japan, Italy, France and India are the principal silk-producing countries. In the manufacture of silk the United States has made great strides in recent years. In 1905 there were 624 silk-mills, their capital $109,000,000. The gross value of products was $133,288,072. Pennsylvania and New Jersey are the principal silk-manufacturing states, Paterson, N. J., sometimes being called the Lyons of America.

Silliman (*sĭl′lĭ-man*), **Benjamin,** an American scientist, was born at Trumbull, Conn., Aug. 8, 1779. He studied at Yale College, and, after his appointment there as professor of chemistry, attended chemical lectures for three years at Philadelphia and for one year at Edinburgh and at London. He filled the chair of chemistry at Yale for about 50 years. He did much to make the study of chemistry and geology popular by public lectures through the country in 1808. He was the first president of the American Association of Geologists and Naturalists, and founded the *American Journal of Science*, known as *Silliman's Journal*, which he edited for 28 years. His textbook on chemistry was published in 1830. He died at New Haven, Conn., Nov. 24, 1864. See *Life* by Fisher.

Silo′am, a pool cut in the rocks southeast of Jerusalem and connected with it by an aqueduct.

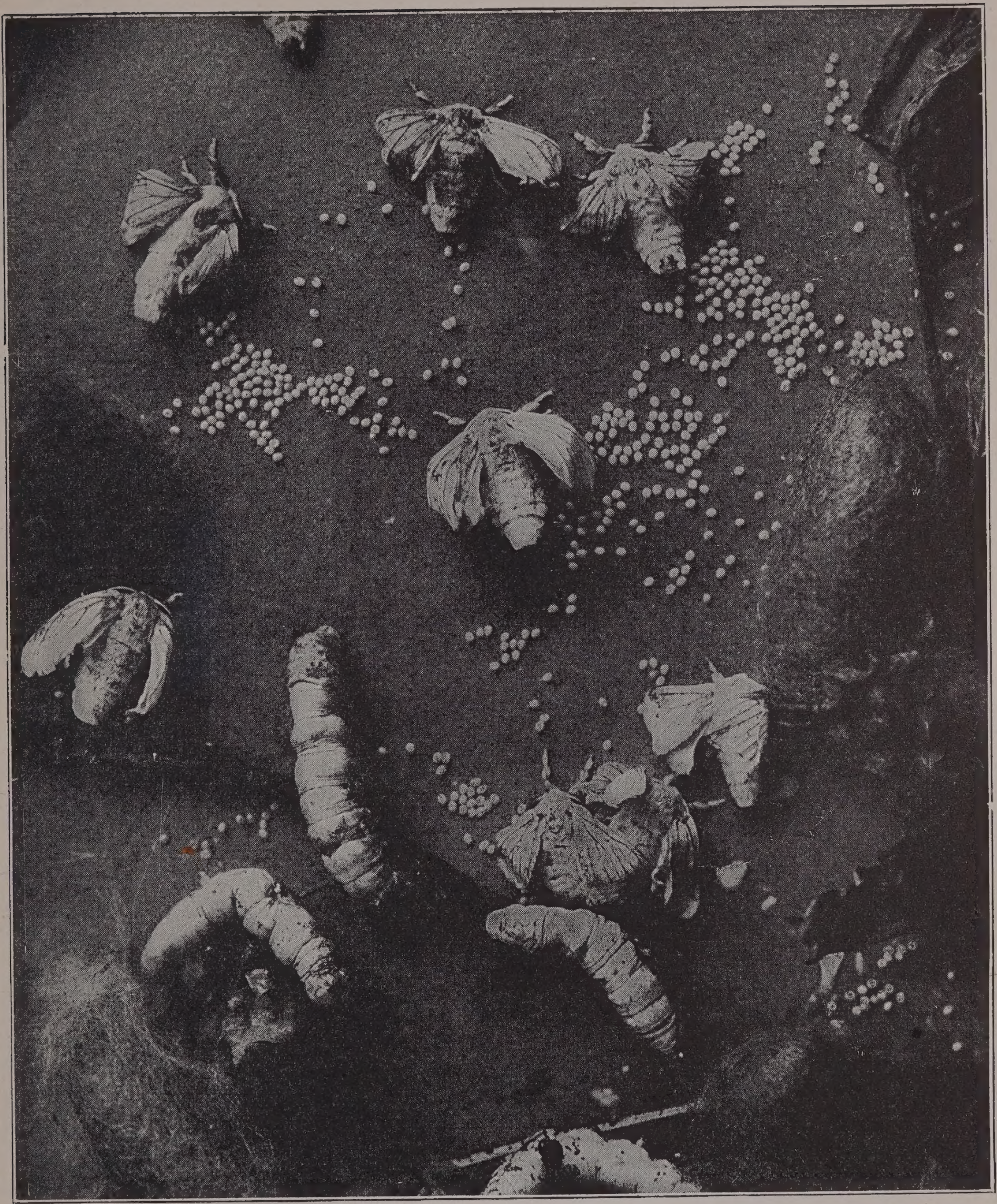
Sil′vas or **Sel′vas** are the plains which center about the middle of the Amazon. They take their name from the thick jungle or forest with which they are clad. Their area is not far short of 1,000,000 square miles, one sixth of which is subject to periodical floods. No jungle is so thick as that of the *selvas*, where the sun hardly penetrates and mankind is represented only by a few Indians. Animal life, including jaguars, monkeys, birds, snakes and insects, is abundant and of great interest to the naturalist.

Sil′ver, one of the metals, ranking among the commoner metals next to gold in value. It is known by its white color, its luster and the ease with which it is worked. It is harder than gold and takes a fine polish. It is never found pure, being always mixed with a little copper or gold or some other metal, but in what is called its native state it is widely distributed. It is almost always found associated with gold, and all gold when mined contains more or less silver. The combinations of silver with other substances, as sulphur, oxygen and chlorine and especially in the ores of lead, form the largest part of the silver-ores found. In Europe the largest silver-mines are in Germany. Those of Norway have been worked since 1623, and in 1909 produced nearly $110,800. One piece of silver in Copenhagen Museum weighs 560 pounds, and another piece was dug out in Norway weighing over 1,500 pounds. Silver is also found in Spain, Italy, France and Turkey. The mines of silver in the United States are found mostly in Nevada, Arizona, California, Idaho, Utah, Colorado, New Mexico and Montana. Comstock Lode, a silver-mine in Nevada, probably is the most productive one ever worked. The silver-region of the western United States was discovered only in 1859, but now produces about one-ninth of the silver of the world, being $28,455,200 in 1909. The rich silver-mines of Mexico and Peru, worked by the Indians, were developed by the Spaniards after the conquests in the 16th century. Humboldt reports about 3,000 different mines in operation in Mexico, and in 1909 the production was valued at $38,450,100. Australasia is now added to the silver-producing countries, the yearly product of the silver-districts being $16,241,300.

Silver is one of the most useful of the metals, being used in coinage, plate and jewelry, and its compounds in photography, glass-staining etc. It is too soft to be used alone, and is generally mixed or alloyed with copper. Silver-coins in the United States contain one tenth of copper and nine tenths of silver. See METALLURGY. Consult Phillips's *Gold and Silver.*

Sim′coe, John Graves, was born in Northamptonshire, England, in 1752 and died in 1806. He was educated at Eton and at Merton College, Oxford, and when 19 entered the army. His regiment took part at Bunker Hill in 1775 He was appointed lieutenant-governor of Upper Canada in 1792, and took up his residence at Newark near the mouth of the Niagara River. The whole population of the province then did not exceed 20,000. There were a few settlers at Kingston, York, Newark and at the front in the Bay of Quinté district; and some roving bands of Indians. About two months after his arrival the first provincial parliament of Upper Canada met. It consisted of 16

STORY OF SILK



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Silk is made from the cocoons of the silk worm, a sort of caterpillar which is hatched from the eggs of a small moth. The picture shows the moth, the eggs which it lays, the larva or worm which is hatched from the eggs of the egg and the cocoon which the silk worm spins. The egg is small and nearly round, looking much like a turnip seed The moths are carefully kept, the eggs are collected and are kept warm until hatched. The worm when hatched is a tiny little thing, covered with long hair, has a shiny nose and sixteen small legs. The worms are fed with chopped mulberry leaves until they are full grown. which is about thirty-two days after hatching.

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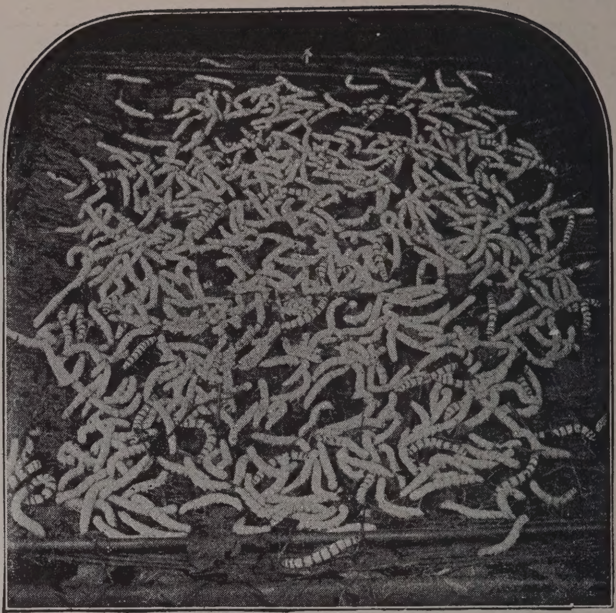
Orchards of white mulberry trees are grown to supply food for the silk worms. Here we see an orchard in Japan where men are gathering mulberry leaves which will be taken to the rearing-house in which the worms are fed.



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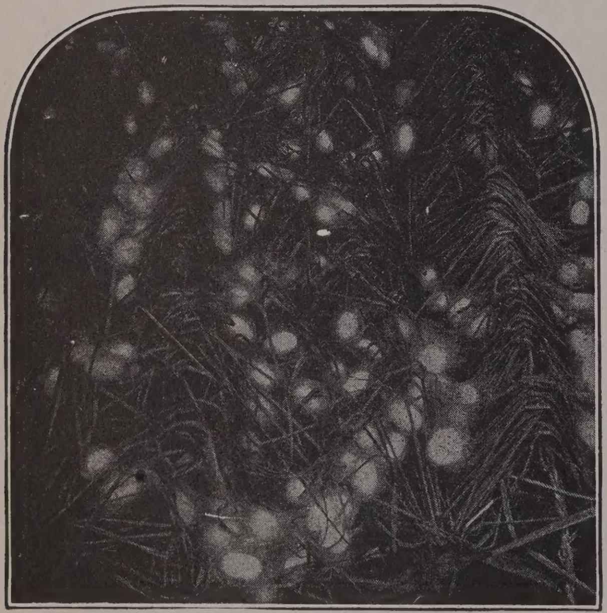
The worms are kept in trays made of matting and these are placed on racks, for convenience and to give them plenty of air. The mulberry leaves are placed beside the worms which eat the tender parts between the veins of the leaf. When thousands of worms are eating, they make a sound like a gentle shower of rain. Here we see a tray of worms feeding on the leaves.



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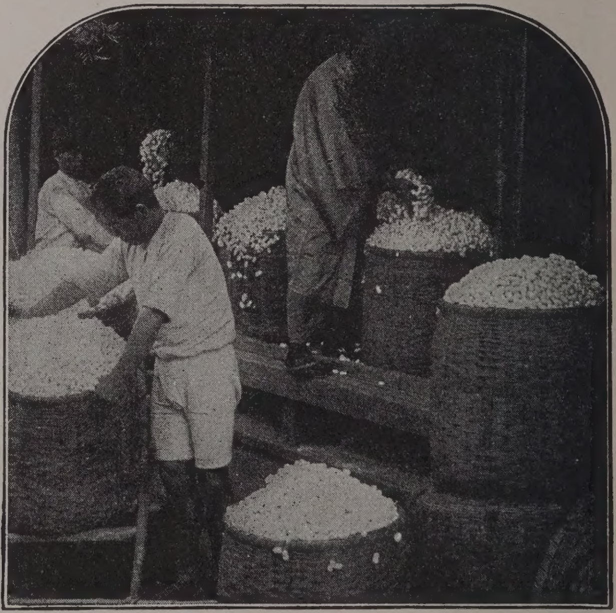
When the worms are full grown and ready to spin, they are placed on twigs or coarse straws spread over frames, as we see in this picture. There are two long silk glands running along the sides of the body of the worm which open together on the under lip. The worm spins the cocoon by ejecting from these glands a fluid which hardens immediately, forming a thread of 800 to 1200 yards in length, moving its head around in regular order for about three days.



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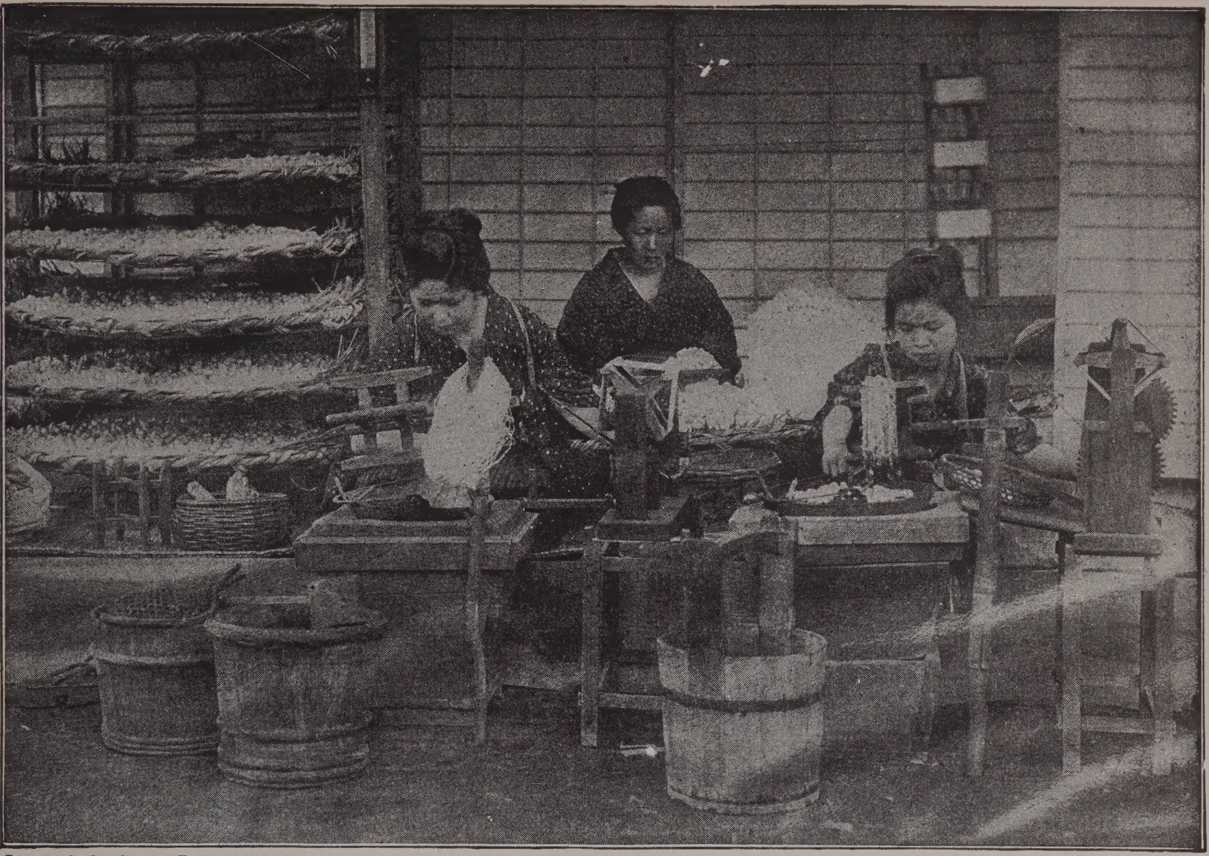
The cocoons are brought to market in large baskets by the silk farmers. Here they are carefully examined and marketed. In natural order the worm in the cocoon is transformed into a chrysalis and later into a moth, which comes out of the cocoon. This ruins the cocoon for reeling and hence the cocoons which are to be used for the manufacture of silk are heated and the chrysalis killed.



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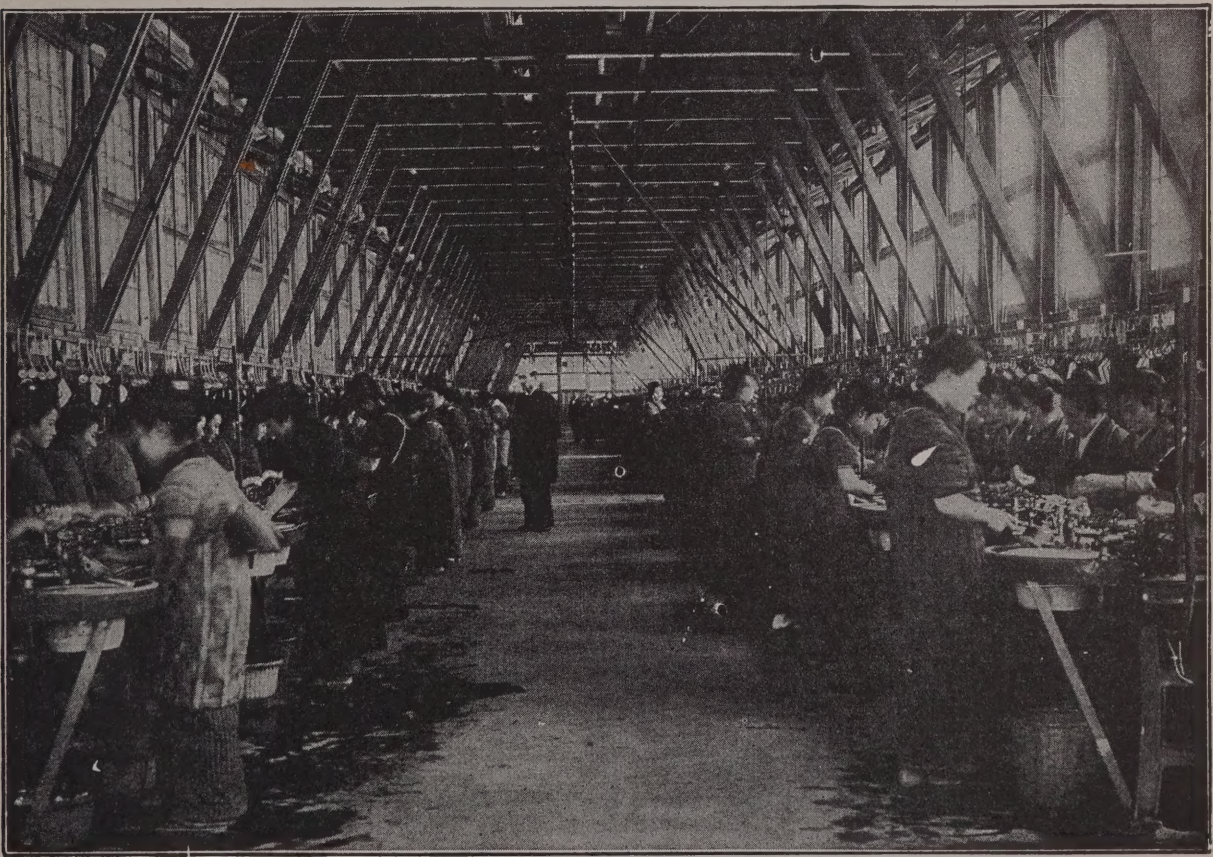
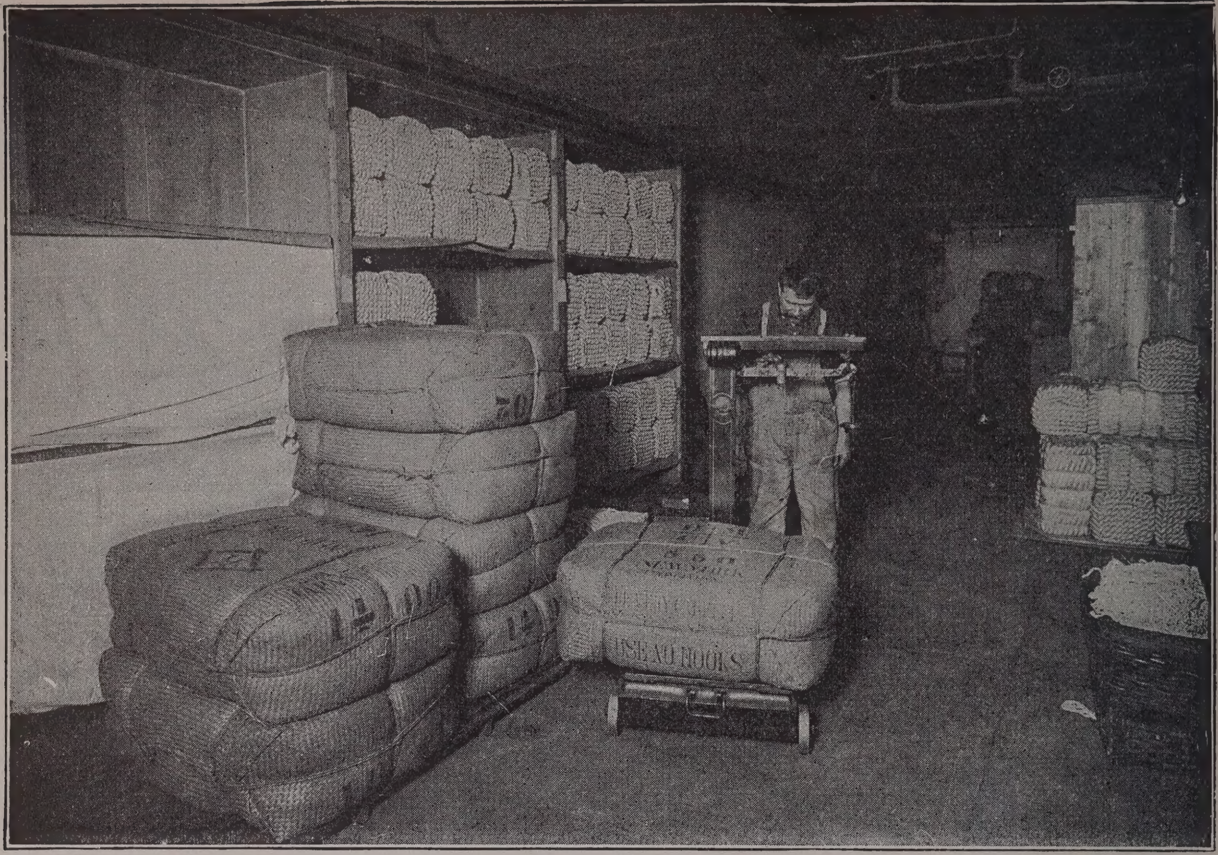
The cocoons are then sent to the reelers. A few of the cocoons are placed in a basin of hot water, which softens the gum; the outside fibres are removed so that a single thread runs free, just as you would unwind a thread from a ball; the ends are collected together through a guide and wound up on the reel, the fibres from the different cocoons making one single thread. This picture shows the old method of reeling by foot machine.



From Brown Bros.

This picture shows the new style of reeling in Japan, by power machinery.



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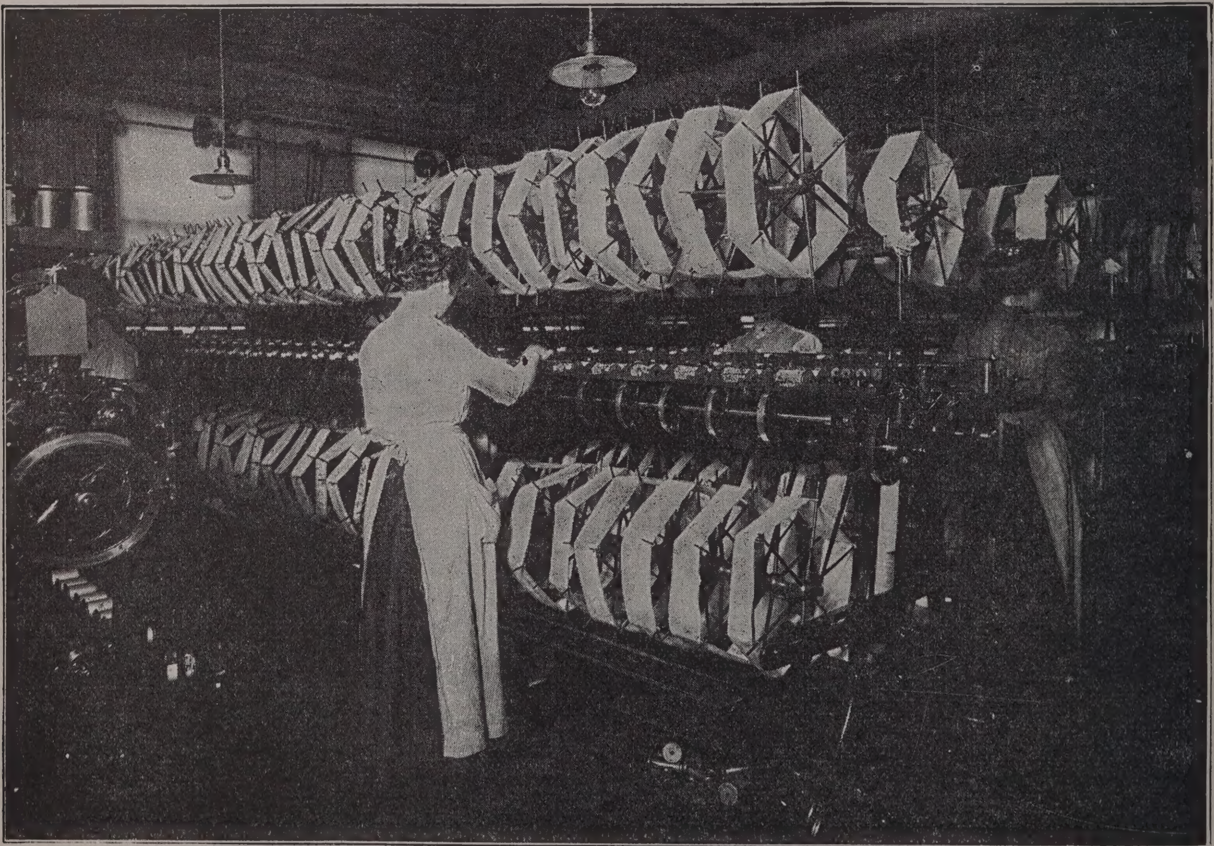
The raw silk is taken from the reel and twisted into skeins and placed in bundles. These bundles are packed in bales for shipment. This picture shows the raw silk in bales as it is received in this country. Here the bales are weighed and then opened and the bundles of skeins placed on shelves, ready for use.



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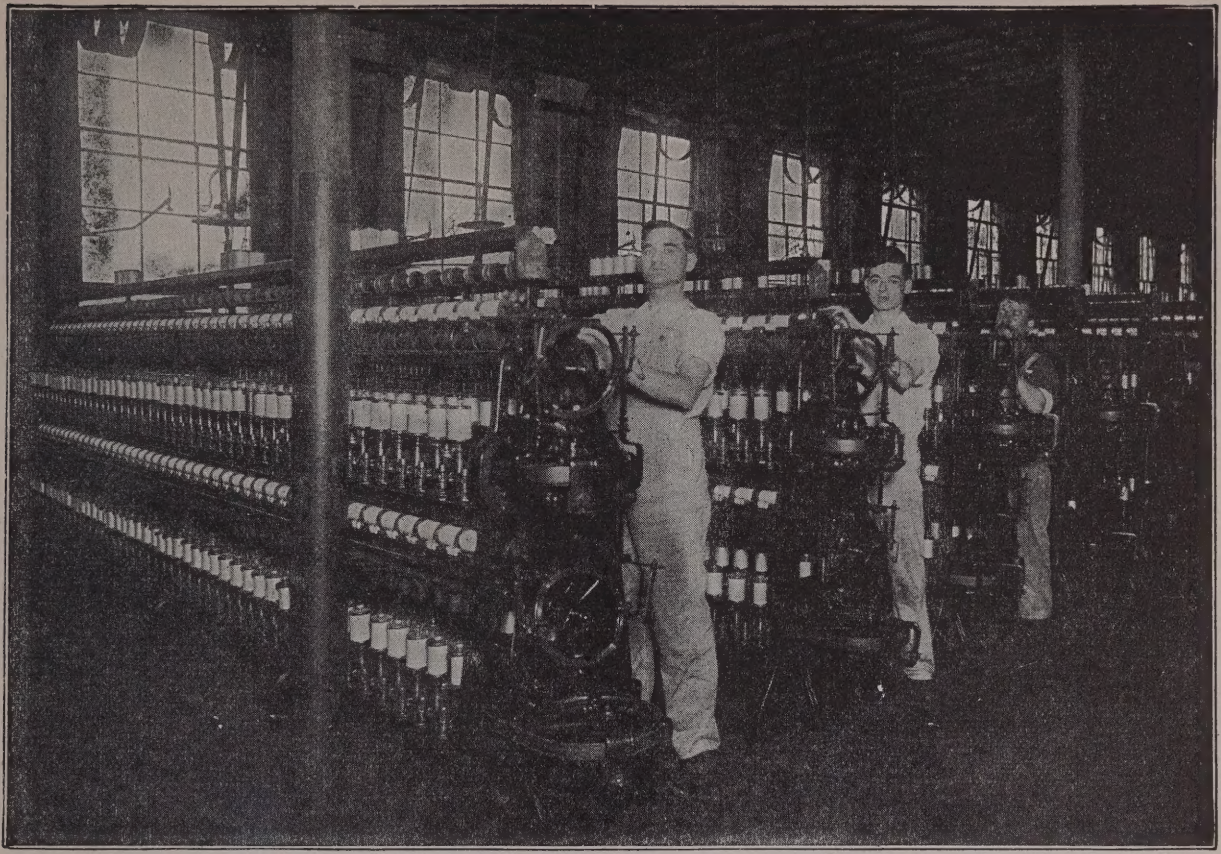
The skeins of raw silk, after having been soaked to soften the gum, are taken to the winding room which we see here. You will see the skeins placed on two long rows of swifts, one above and one below. From these the silk is wound onto bobbins, or large spools, which you see in the center, under the operator's hand.



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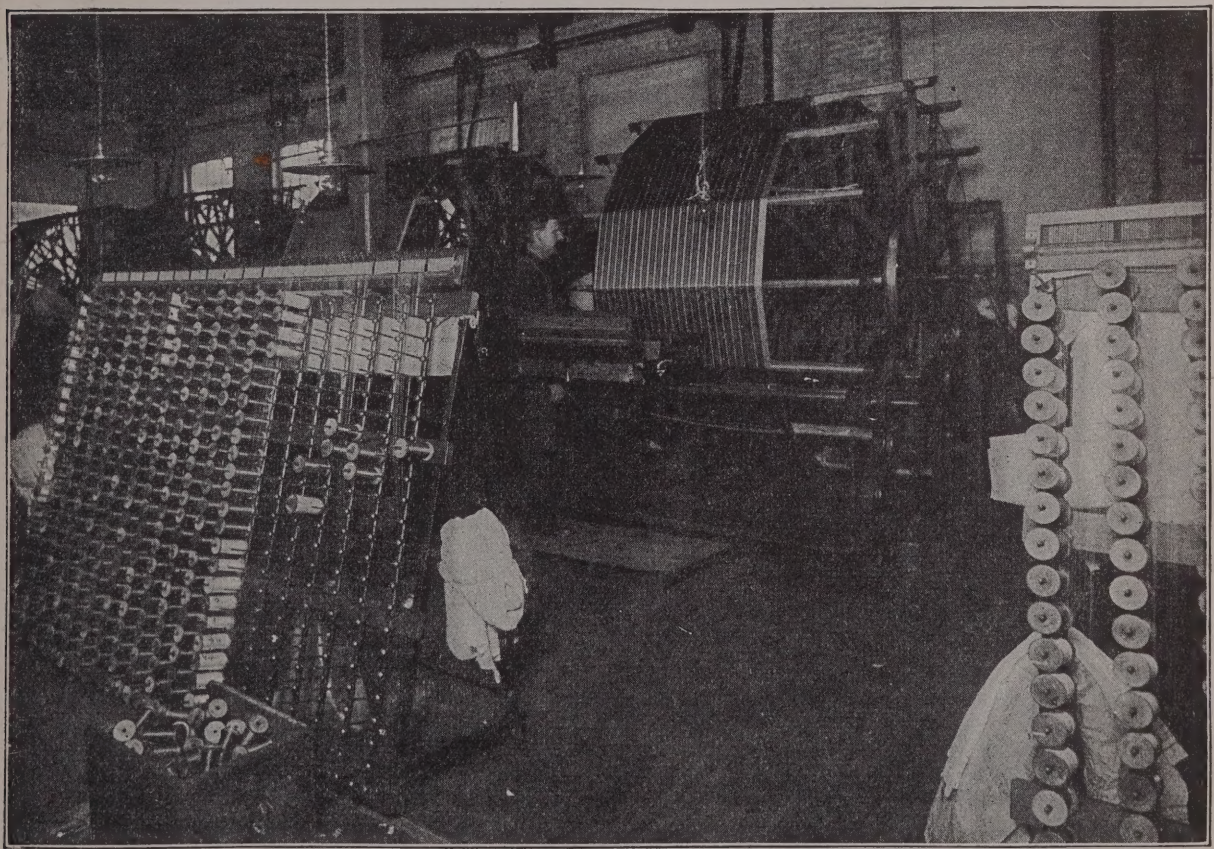
SPINNER. From the doubling frames the bobbins are placed on the spinner, as shown in this picture. On this machine the bobbins are made to revolve at great speed and the threads, which have been brought together on the doubling frame, are spun into one thread and carried onto another bobbin. In this way the various kinds of thread, as warp, sewing silk, machine twist, etc., are made.



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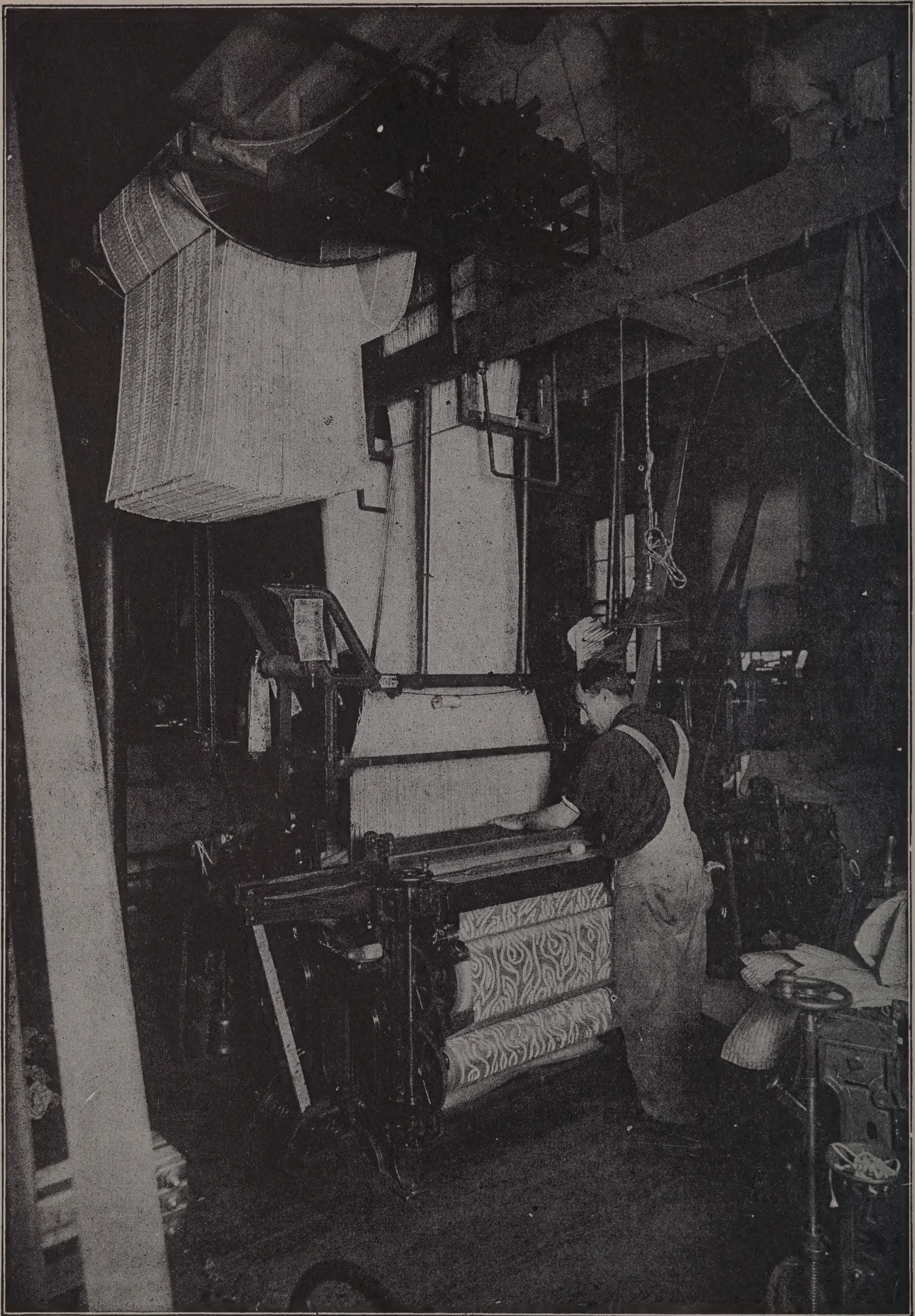
WARPING FRAME. The threads that run lengthwise in cloth are called warp. The warp is made by placing a large number of bobbins on a rack or creel, and running the threads from this on a reel into sections. The whole number of threads is then wound from the reel to a roll or loom beam. The picture shows the warping frame, the rack or creel, etc.



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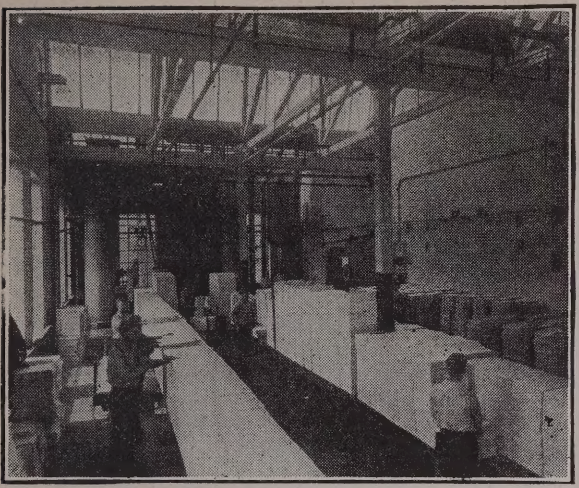
Here we have a picture of a modern silk loom on which silk goods are woven. The designs which are seen above are woven into the fabric and can be seen on the completed goods at the man's knees.

FACTORIES *that* IMITATE *the Lowly* SILKWORM

STEPS IN PROCESS OF MANUFACTURE OF VISCOSE RAYON



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CUTTING THE DRIED PULP

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SPINNING ROOM WHERE VISCOSE IS SPUN INTO RAYON

Rayon

Slowly crawling over green mulberry leaves, the humble silkworm mixes its fluid with the plants and spins a cocoon for human beings to unravel and weave into cloth. But so slowly does it work that manufacturers have built factories to produce somewhat the same results. In 1889 the first great enterprise began to manufacture artificial silk, according to a process devised by a Frenchman, Count Chardonnet. Only a few years ago the several manufacturers of the product gave artificial silk a new and distinctive name, "rayon," a term so recent that many persons do not know yet what it means.

When machinery was turned to the manufacture of artificial silk, the raw product was not limited to mulberry leaves, but came to include raw cotton and whole spruce trees. The wood is digested in great steam boilers, a process which separates the valuable cellulose from the rest of the material. The cellulose is then treated chemically as a solution, after which the thickened liquid is forced by pumps through holes so small they can hardly be seen. In a bath of acid these streams solidify into thin strands, a great number of which are woven together to make a single thread.

The manufacture of rayon is rapidly increasing. About 75,000,000 pounds (37,500 tons) of raw silk are produced yearly. Factories making hosiery, knit goods, silk goods, cotton goods, braids and underwear consume most of the output.

The process, though a difficult one, is not so expensive as the method employed in making real silk. Real silk remains, of course, more desirable, enduring, and expensive. But for many articles of apparel rayon has come as a beautiful cloth at a comparatively cheap price.

A real achievement was won by the inventors when they succeeded in liquefying cellulose and then hardening it in very thin stands until it would stand the wear of careful washing. They are working now to improve the beauty and durability of rayon and to make it more and more like real silk.

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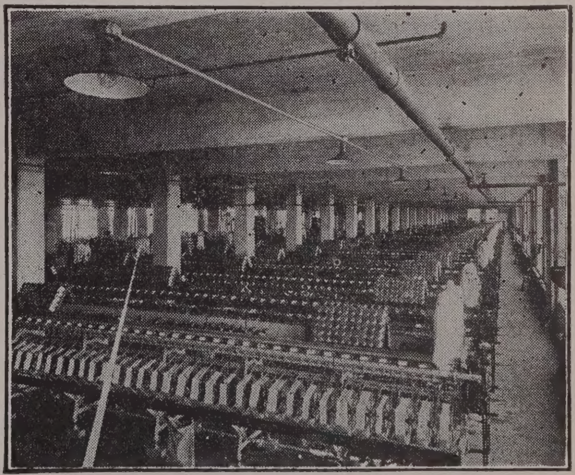
REELING DEPARTMENT WHERE RAYON IS FIRST PUT INTO SKEINS



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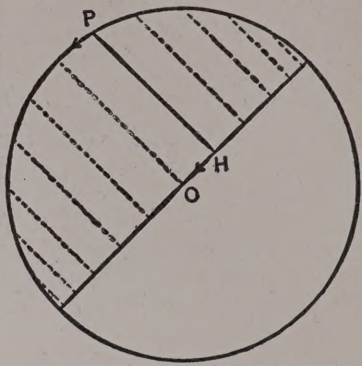
WHERE RAYON IS WOUND FROM SKEINS TO SPOOLS elected and eight appointed, representatives He selected York (since 1834 Toronto) as the capital. He took great interest in making surveys and locating roads, one being even now sometimes spoken of as Governor's Road. Simcoe County and Lake are called after him. A monument to his memory has been erected in Queens Park, Toronto, in sight of the new parliament buildings.

Simms, William Gilmore, American historian, novelist and poet, was born at Charleston, S. C., April 17, 1806, and died there on June 11, 1870. In early life he studied law, but abandoned it for journalism and, later, for literature. He specially devoted himself to writing a series of 17 volumes of fiction, including romances of colonial life, romantic tales of revolutionary incidents in South Carolina, of which he wrote a history, a geography of the state and an account of South Carolina in Revolutionary times. He for several years was a member of the legislature, and filled other political offices. He had, besides a fertile mind, a vivid imagination and the power of writing an interesting and realistic novel; he also wrote verse, of which a compilation exists. Of his novels perhaps the most notable are *The Yemassee*, *Guy Rivers*, *Pelayo*, *Carl Werner*, *The Scout*, *The Partisan*, *Count Julian*, *Mellichampe* and *Border Beagles*. His best, as it is his longest, poem is entitled *Atalantis: a Drama of the Sea*. See Geo. W. Cable's *Life* in the American Men of Letters Series.

Simonides (*sī-mŏn′ĭ-dēz*), a Greek lyric poet (B. C. 556–469), a native of the island of Ceos, though early in his career he appears to have been banished and took up his residence partly in the Peloponnesus, with occasional visits to the court of Hiero of Syracuse as well as to the ruling families (the Scopadæ in particular) of Thessaly. He became famous by his dirges, epigrams and funeral inscriptions in honor of those who fell in the Persian Wars as well as in praise of the Athenians who took part in the notable struggle. The chief theme of his song was, in an especial manner, the devotion of Leonides and his 300 at Thermopylæ. In his finished versification, as well as in the choice and variety of his themes, his song has been compared to that of Tennyson. Especially fine are his meter, language and thought. Another of his name is the Greek poet Simonides or Semonides of Amorgos, a native of Samos (about B. C. 660). Only fragments of his work, however, have come down to us.

Simoom (*sĭ-mōōm′*) or **Simoon,** a hot, suffocating wind, common in the deserts of Africa and Arabia. It is very much like a cyclone, with a calm center surrounded by whirling blasts of very hot air, the whole moving slowly from south to north or from east to west. It often carries along columns of sand, and is indicated by a purple atmosphere. It is very injurious both to men and animals, causing severe pain and a feeling of suffocation. It lasts only for a few minutes, not more than 20 at the most, and occurs in spring and summer. See SCIROCCO.

Sim′ple Harmon′ic Mo′tion is the projection of uniform circular motion upon a diameter of the circle. Referring to the accompanying figure, let P be a point moving with uniform speed in the circumference of the circle. From the point P, in each of its successive positions, imagine a perpendicular let fall upon the diameter there shown. The motion of the foot of this perpendicular H to and fro along the diameter is a simple harmonic motion, and is often indicated by the letters S. H M



SIMPLE HARMONIC MOTION

The circle in which we have imagined the point P to move is called the *circle of reference*. The radius of this circle is known as the *amplitude* of the S. H. M. The time occupied by one round trip of the point H to and fro across the diameter is called the *period* of the S H. M. The angle between the radius OP and the radius from which angles are measured in this circle is called the *phase* of the S. H. M. The value of the phase at the instant from which time is measured is called the *epoch* of the S. H. M. The distance of the point H from the center of the circle at any instant is called the *displacement* of the S. H M.

Any S. H. M. is completely described only when we know four things about it, namely: (1) the *amplitude*; (2) the *period*; (3) the *phase* at any time, t; and (4) the *direction* of motion of the point P in the circle of reference. If we denote the amplitude by A, the period by T, the phase by O and the displacement at any instant, t, by x, then the equation of S. H. M. is

$$x = A\cos.\ \frac{2\pi}{T}t$$

$$\text{where } \frac{2\pi}{T}t=\theta$$

No one motion in nature is more frequently met with than S. H. M. The motion of a freely suspended pendulum-bob is practically simple harmonic. A ball suspended by a vertical, spiral spring oscillates up and down in a vertical line with a S. H. M. Air-particles set in motion by a tuning fork vibrate to and fro with a S. H. M. Ether-particles when traversed by a ray of light probably vibrate with a S. H. M. Consult Worthington's *Dynamics of Rotation* or Daniell's *Physics* for more complete discussion.

Sims, Admiral William S. Like the most famous naval hero of America's first fight for liberty (See Paul Jones), Admiral Sims is not a native American. Canada, whose brave and brilliant soldiers so distinguished themselves on the great battlefields of Europe, shares with the United States the distinction of having given to the cause of human liberty the invaluable aid of Admiral Sims' services on the sea. Although he received his education for his great task in the United States, having been appointed to the United States Naval Academy, of which he was a graduate in 1880 from Pennsylvania, Admiral Sims was born at Port Hope, Canada, October 15, 1858.

Just before the Spanish-American War, he was naval attache at Paris. Later, as fleet intelligence officer on the staff of the commander-in-chief of the Asiatic Station he became intimately associated with Sir Percy Scott of the British navy. Sharing with Captain Scott the belief that the ability to shoot rapidly and with accuracy at long range is the most important thing in naval warfare, he urged the great importance of target practice, and having demonstrated conclusively the relative inaccuracy of American naval gunners at that time as compared with those trained under Captain Scott, President Roosevelt placed him at the head of the office of target practice, where under new methods introduced by him, the men made wonderful records, both in accuracy and rapidity of fire. Later he commanded the torpedo flotilla of the Atlantic fleet and as Rear-Admiral, the rank to which he was promoted in December, 1916, he took the torpedo squadron into British waters. There he immediately began to cooperate with the British navy in the suppression of the submarines; with what good results the records show.

Although his business in war is to destroy the enemy and sink his ships, Admiral Sims, like many other great soldiers, is so shocked by the thought of causing needless suffering that he never hunts and he never fishes. Instead he finds his chief amusement in—what do you think?—writing limericks! As an illustration of his boyish delight in this practice, it is related that when seated with a number of fellow officers around the conference table, when he was inspector of target practice in the Asiatic fleet, he was observed to be busy writing while the others were discussing naval subjects. When he had finished every one looked up expectantly, supposing that he intended to submit some carefully written remarks on the subjects discussed. Instead he handed each officer a limerick in which he had embodied his own keen observations on all of the debated questions.

Sinai (*sī'nī*), a mountain in northwestern Arabia, known as the place where Moses received the tables of stone inscribed with the Ten Commandments. The mountain is a single peak in a great rocky mass which almost fills the peninsula of Sinai, a point between two arms of the Red Sea: the Gulf of Suez and the Gulf of Akaba. There are three separate mountains, Mount Catherine being the one usually thought to be indicated by the name Sinai. This mountain has two peaks, the northern one, known as Mount Horeb, and the southern one, called the Mountain of Moses. This southern peak is generally agreed upon as the place of the giving of the law, though it is still disputed. At its foot is the Church of St. Catherine, built about 527 by Emperor Justinian; a little higher up, the chapel of St. Elias; and on the summit a little pilgrim-church. The whole peninsula, as well as the bold, jagged mountains, has a stern, treeless aspect, though palms acacias and tamarisks grow in the ravines. The Bedawin Arabs range over the region with their sheep and goats. There are many caves among the mountains, which have been the abodes of hermits, and many inscriptions on the rocks which date back to the era of the early Christians. Consult Dean Stanley's *Sinai and Palestine* and E. H. Palmer's *Desert of the Exodus*.

Singapore (*sin'gă-pōr'*), ("Lion City"), a town of India on the island of Singapore. It was founded in 1819 for the British trade in the East Indies, and is the most important trading-place in southeastern Asia. Population, 311,985. The harbor is large, and is used as a naval coaling-station and depot. The island is 27 miles in length and 14 miles in breadth and has an area of 206 square miles. Singapore, a crown-colony in the Straits Settlements, embraces Christmas and the Cocos Islands, the other settlements being Penang and Malakka.

Single Tax. A theory of taxation which proposes to abolish all taxes that fall upon property gained through industry and economy, substituting a single tax on land equal to its rental value exclusive of improvements. Thus the "unearned increment," as represented by the increasing value of land, would accrue to the benefit of the community as a whole and not to the private owner as at present.

The arguments in favor of the single tax are first, that as land in no way is a product of man's labor, it should be equally shared by all; the increase in the value of land depends upon the development of the community, and therefore the increment should belong to the community rather than to the individual. Second, land can be easily assessed and always guarantees payment of taxes. The tax would discourage holding land for speculation, since it must pay in proportion to value rather than income. See *Progress and Poverty* by Henry George.

Mr. George's book is distinguished, not only for its clear and forcible presentation of this theory of justice in taxation but for its brilliant style. For example, in pointing out that the growth of wealth with the development of small communities into cities is always accompanied by growth of poverty, he says: "It is in streets lighted by gas and patroled by uniformed policemen that beggars wait for the passerby."

The objections come from those who believe in private ownership of land and from Socialists. The former hold (1) that the landowners have put their industry into the land, even if they have not produced it; (2) that single tax would not produce sufficient revenue; and (3) that the sense of private ownership of land has been the "keystone of society." Socialists hold that both land and capital should be the property of society; that capital is not the product of the labor of any individual or of the few; and that, therefore, single tax would be only a half-solution.

Sioux (*sōō*), a group of tribes of American Indians belonging to the Dakota family. They are the principal tribe of the family, and sometimes their name is given to the whole family. They were living near the head-waters of the Mississippi when found by the whites. In their wars with the Chippewas and the Hurons some of them were driven farther south, but in 1822 they numbered about 12,000 and their lands stretched from the Mississippi to the Black Hills. In 1837 and in 1851 they ceded parts of their land to the United States. The failure of the government to carry out their treaties irritated the tribes, and they troubled the white settlers for years and in 1862 made a general uprising, killing nearly 1,000 whites. New Ulm, in Minnesota, a town of 1,500 people, was nearly destroyed. This rebellion ended in the imprisonment of more than 1,000 Indians and the execution of 39 of the leaders, and cost the United States $40,000,000. The Santee Sioux were placed on reservations near Yankton, S. D., where they have become peaceful farmers. After a vain endeavor to settle matters peacefully, Sitting Bull (*q. v.*), a young chief, and others going to Washington for the purpose, the hostile tribes gathered in northern Dakota and began the war of 1876, in which General Custer perished. Large settlements of the Sioux have been made since in South Dakota. In 1890, under a "messiah," there was another rising of the Sioux in the northwest. They now number about 25,000. Consult Riggs's *Forty Years among the Sioux.*

Sioux City, Ia., a city on the Missouri, which is crossed by a bridge 2,000 feet long, and by a combination structure for the use of wagons, street-cars and railways. It is a railroad-center and a manufacturing city, and has a large trade, being situated in a fine farming-region. There are large meat-packing establishments and flaxseed-oil mills and vast quantities of stoneware; 25,000,000 bricks a year are made. Among the notable buildings are the city-hall and public library, the Federal building and the Young Men's Christian Association building. The city has a good system of public schools, the high school erected at a cost of $100,000, and here is Morningside College, a Methodist Episcopal institution. It is the county-seat of Woodbury County. Population 110,000.

Sioux Falls, So. Dak., the largest town in the state, is on Big Sioux River and takes its name from the falls which descend 90 feet and afford an excellent water power. The city was laid out in 1857, and destroyed by the Sioux in 1862. It was rebuilt in 1865 after Fort Dakota was abandoned. The buildings are nearly all of red quartzite. The great industry is the quarrying and polishing of the quartzite underlying the city. There also are numerous manufactories, 66 wholesale houses, a state penitentiary, a public library, six banks, ten public schools, six colleges and denominational schools, twelve churches and six railroad systems. It is the county-seat of Minnehaha County. Population 32,000.

Siphon (*sī′fŏn*), an instrument for transferring liquid from a vessel at one level to another at a lower level. The simplest possible form is shown in the accompanying figure, where the liquid A is being emptied into the vessel D. In order to start a siphon the pressure of the air must be diminished in the branch C D. The pressure of the atmosphere on the surface B then forces the liquid up the arm A C, and, in flowing down the arm C D, this liquid acts as a pump and keeps the pressure in C D below that of the atmosphere. Evidently, however, this pumping must cease as soon as the liquid in the vessel D rises to the same level as the surface B. It is also clear that, since the water is driven up into the arm A C by means of the earth's atmosphere, no siphon will work in a vacuum. The safest and most convenient form of siphon, especially

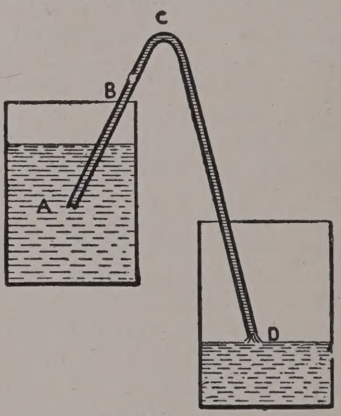


FIG. 1

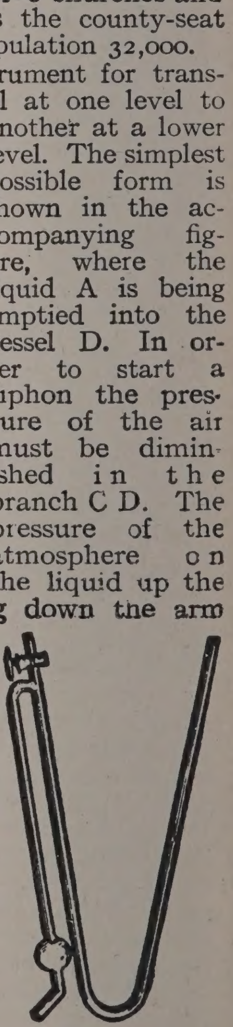


FIG. 2

for transferring acids is that shown in figure 2 which is provided with a mouthpiece for starting, but without danger of getting acid or poison into the mouth. The action will be evident from the figure.

Siphonogamy (*sī-fō-nŏg'ȧ-mĭ*), a condition in plants in which pollen-tubes are developed for the transfer of the male cells to the eggs. The seed-plants are siphonogamous; while in the lower plants the male cells usually swim to the eggs. As a consequence, the *Spermatophytes* are called Siphonogams by some botanists.

Si'rens, sea-nymphs in Greek mythology, who sat on the shores of an island off the southwest of Italy and by their songs lured passing sailors to death. The *Odyssey* tells the story of Ulysses stopping the ears of his companions with wax and lashing himself to a mast, till they had sailed out of hearing of the fatal songs. The Argonauts also were carried past in safety, because the music of Orpheus had a stronger spell, seeing which the sirens threw themselves into the sea and were turned into rocks. By the Latin poets they are represented with wings, and in art as birds, with the faces of young women. Consult Harrison's *Myths of the Odyssey in Art and Literature.*

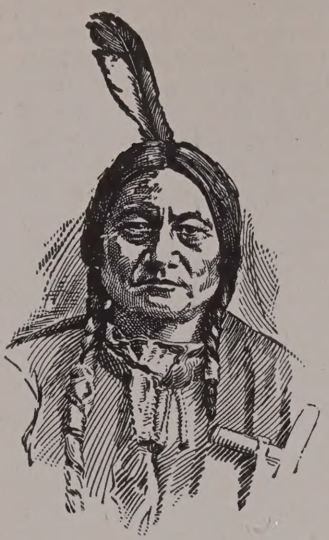
Sir'ius. See Dog-Star.

Siroc'co, a hot wind which blows on the southern coasts of Italy, lasting sometimes a week. It is hottest in Malta and Sicily, but does not last as long as on the Ionian Islands. It is like the simoom, and produces the same feeling of suffocation and exhaustion. See Simoom.

Sisyphus (*sĭs'ĭ-fŭs*), in Greek mythology, the son of Æolus, the founder and king of Corinth, and noted for his wickedness, for which, according to Homer, he was condemned to roll a large stone up a hill, which, when it reached the top, fell back again, so that his task was never ended.

Sit'ka, the former capital of Alaska, on the west coast of Baranof Island. It has a deep harbor, dotted with islands, with snowy peaks rising behind the town. There are a fine green-spired Greek church and an old Russian palace. The climate is cold, with a large rainfall. Population 1,395. See Alaska.

Sit'ting Bull, an Indian warror of the Sioux (*q. v.*) was born in 1837. When gold was found in the Black Hills, an effort was made by the United States to purchase the land of the Sioux, to whom it belonged. They were very unwilling to give it up, and Sitting Bull, Red Cloud and Spotted Tail, with other chiefs, visited Washington in May, 1875, but would not sign the treaty. The failure of the government to keep its promises and the actions of the settlers in pushing on to the lands kept up a feeling of hostility, and the young braves gathered around Sitting Bull in northern Dakota. General Custer, with a small force, was sent against them, and he and his followers were all killed; but the Sioux were at last conquered and Sitting Bull escaped to Canada, but on promise of a pardon surrendered. In the rising of the Indians of the northwest in 1890 Sitting Bull was killed.



SITTING BULL

Six'tus, the name of five popes.

Sixtus IV was born on July 22, 1414, near Savona, Italy. He had a great reputation as a preacher throughout Italy. He became pope in 1471. He exhausted the treasures of the papal church in providing for his relatives, and took part in a conspiracy against the Medici at Florence. Learning and, especially, the improvement of Rome owed much to him. He built the Sistine chapel and the Sistine bridge across the Tiber, increased the Vatican library, and patronized the great painters of his time His union with the Venetians against the duke of Ferrara brought on an Italian war, which ended in the breaking up of the Venetian alliance. The pope is said to have died from mortification at this result, Aug. 13, 1484. Consult Ranke's *Lives of the Popes.*

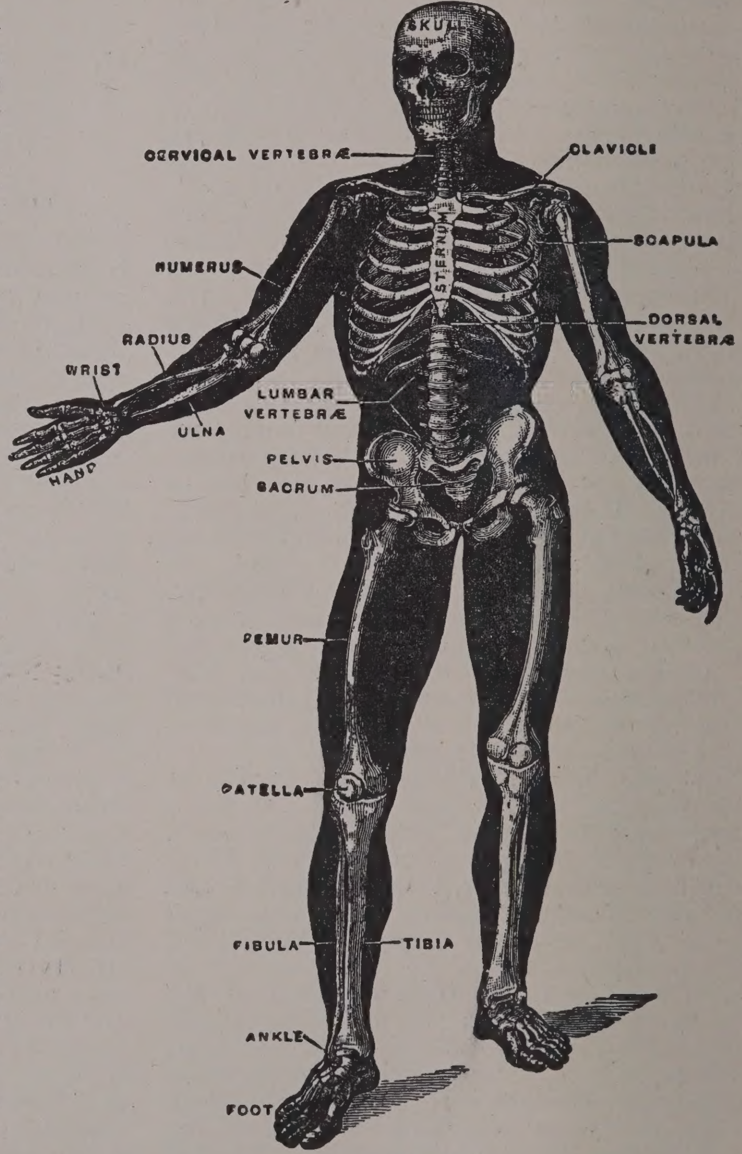
Sixtus V, one of the ablest of the popes, was born on Dec. 13, 1521, near Montalto, Italy. He was a professor of theology at Rimini and Siena, an eloquent preacher, vicar-general and cardinal. While Gregory VIII was pope, Sixtus lived in retirement and was thought to have become old and infirm, which recommended him to the cardinals, who were to select a successor to Gregory. But those who thought to lead him were soon undeceived by his vigorous administration. He stopped disorder, improved the working of the laws, and gave liberty to the Jews to worship in their own way and trade in his dominions. He built the library buildings of the Vatican, authorized a new edition of the Septuagint and the Vulgate, and in every way carried out his policy of increasing the power of the Roman church against the Huguenots, the Lutherans and Queen Elizabeth He died on Aug. 27, 1590. Consult Ranke's *Lives of the Popes.*

Skag'er-Rack (*sgăg'ẽr-råk*), an arm of the North Sea, between Denmark and Norway. It is 140 miles long and 70 broad. It is subject to violent storms, but when quiet the current runs east on the coast of Denmark and west on that of Norway. The harbors are all on the coast of Norway.

Skate, a common name of several kinds of the ray. The tobacco-box skate, barn-door-skate and briar-skate are American varieties, and the tinker and the gray skate are found in Scotland and in England. Their egg-cases, called mermaid's purses, are often thrown upon the beach. The flesh is coarse, and the expanded fins are the parts usually eaten.

Skat'ing is moving on the ice by means of steel blades fastened to the soles of the shoes, called skates. In early times the shin-bones of animals were tied to the feet, and, by using a stick to push with, the wearer could move over the smooth surface of the ice. Skates now used are of two kinds, those for speed and those for figure-skating. The blades for speed-skating are very thin and are longer than the foot, while those for making figures are broader and are rounded at the toe and heel. In the northern countries of Europe, where the ice has a slight covering of snow, skating is very popular. The motion is rapid, the Frieslanders often traveling 15 miles an hour. Skate-racing is often practiced, the fastest time yet made being a mile in two minutes and 52 seconds. Figure-skating is practiced in America, Canada, Holland, Germany, Norway, Sweden and Denmark. Ice-rinks are used for this amusement, and are often crowded with spectators. Wheel-skates or roller-skates were invented in 1865, by Mr. Plimpton, of New York, though a form of them had been patented in France in 1819. The use of them is a fine preparation for skating, and the amusement has been very popular.

Skel'eton, the hard parts of an animal. Accepted in this broad sense, the skeleton includes the hard outer covering or exoskeleton and the inner bones or endoskeleton. As examples of exoskeletons we have the shells of clams, snails and other mollusks; the shell or *test* of the sea-urchins; the limy plates of the star-fishes; the shell of the lobsters and cray-fishes; the bony carapace and plastron of turtles and the like. The internal bony framework of vertebrated animals is an endoskeleton consisting of bones and cartilages. The comparative study of endoskeletons leads to many interesting conclusions. There are similar or homologous parts in all. For example, the wing of a bat or bird is constructed on the same plan as the flipper of a seal, the fore-limb of a dog, a horse or a man. That is, corresponding bones can be made out in them all. The same is true of hind-limbs and other parts of the skeleton, including the skull. This serves to unite animals on the line of similitude of structure. The hard parts are for protection, when on the outside, and also for the attachment of muscles. Not only is there correspondence between the bones of different animals, but the muscles, nerves and blood-vessels are similar. The fossil bones of extinct animals have furnished clues to the past history of life on the globe. There are upwards of 200 separate bones in the human skeleton. The actual number of distinct bones varies at different periods of life; many bones which are separated in youth become united in old age. The skull has 22 distinct bones in early adult life; but in youth the number is larger and in old age less. There is a tendency for the bones to unite in old age. There originally are 33 separate bones in the spinal column,



HUMAN SKELETON

Twenty-four remain distinct through life, while the lower nine become consolidated into two groups: the sacrum and the coccyx. Twenty-four ribs bound the chest, and most of them are connected by cartilage with the breast-bone or sternum. The shoulder-blades, the collar-bones and two hip-bones are connected with the arms and limbs respectively There are 30 bones in each arm and the same number in each leg, counting the knee-pan. The bones are held together by ligaments. See the illustration for further names. See FOOT, HAND and SKULL.

Skim′mer, a class of web-footed, long-winged sea-birds, belonging to the gull family. They have a long, thin bill with the upper half shorter than the lower. There are only three known species, each being confined to one country. The American skimmers, called shearwaters, skim along the surface of the water in flocks, using the lower part of the bill as a plow to bring up the small fish on which they feed and holding them with the upper half of the scissors which their bills form. They are also called scissors-bill or razor-bill shearwaters. The other varieties are found in Asia and Africa. See GULL.

Skin, the investing membrane of the body of an animal. In vertebrated animals it consists of two layers: an outer epidermis and an inner dermis or true skin. The former is largely for protection, the latter plays an important part in physiology. The epidermis has neither blood-vessels nor nerves, but the true skin is richly provided with both. The dermis is made of a dense felt-work of fibers, and in the human body is from one-fiftieth to one tenth of an inch in thickness in different parts of the body. Its outer surface is raised into little hillocks called papillæ. These are of two kinds — the vascular papillæ containing a network of minute blood-vessels, and the nervous papillæ in which the nerves terminate. There often is an oval touch-corpuscle in which the nerve has its ending. The epidermis lies on the dermis and dips into all of its depressions. It is composed of cells, the outer layers of which are reduced to flattened. scale-like elements, which are continually falling off or being removed by bathing and friction. They are as continually renewed from a deeper layer of plump cells which divide rapidly. Thus the outer skin has two layers — a horny layer and a mucous layer. The latter is the seat of the pigment or coloring granules which impart color to the skin. In negroes it includes a rather dense layer of dark granules. All over the body the skin has minute orifices which are the openings of small tubes connected with the sweat-glands. These consist of coiled tubes in the deepest part of the true skin or just below it. A tubular duct extends from each gland to open on the surface, and as it passes through the layer of the skin it runs in spirals like a corkscrew. The number of sweat-glands varies greatly in different parts of the body; they are fewest in the back and neck, being about 400 to the square inch. On the skin of the palm and sole there are two or three thousand to the square inch. Hairs, nails, hoofs, scales and like structures are outgrowths from the epidermis of the skin. (See HAIR and FEATHERS.) The skin performs important offices. The watery vapor passed off by it in the form of perspiration amounts to about 2½ pounds a day. It also liberates carbon dioxide. In some animals, as frogs, it is an important aid in respiration. It is also concerned in regulating the temperature of the body. When the body is covered with a varnish or layer of leaf-metal, death results, not from stopping the perspiration as was formerly supposed, but by radiation of heat and fall of bodily temperature — the skin being unable under the conditions to regulate the temperature. The touch-corpuscles in the skin give it an important sensory action in connection with the nervous system.

Skull, the hard framework of the cranium including the lower jaw. The skull in fishes and in mammals, although so different in general appearance, is composed of corresponding bones. They are more separated in the fish, and more modified and united in the higher animals. In sharks and other cartilaginous fishes the skull may be entirely cartilaginous throughout life. The question of the nature of the skull perplexed naturalists for a long time. Early in the 19th century Oken, the German philosopher, and Goethe, the poet-philosopher, declared the skull to be composed of modified vertebræ. This idea was extensively developed by Richard Owen, in his great work on *Comparative Anatomy of the Vertebrates.* Thus arose what was called the vertebral theory of the skull. Huxley, however, in 1859 showed that the bony cranium is preceded by a skull of united cartilage, having neither sutures nor joints. The bones are formed later, being mostly laid down in the membranes surrounding the original cartilaginous skull, which disappears. Consequently the bones are not primary structures, and the history of the skull shows that they cannot represent modified vertebræ. By comparing the skulls of different animals corresponding bones can be identified, but the study is technical. Consult Huxley's *Anatomy of Vertebrated Animals* and Parker and Bettany's *Morphology of the Skull.*

Skunk, a carnivorous animal widely known on account of the offensive odor of a fluid which it ejects when frightened or disturbed. There are several varieties found only in the New World both in North and South America. The common skunk is about the size of a small cat, and ranges from Hudson Bay to Guatemala. The body is rather stout, the tail very bushy, and the prevailing colors black and white. It usually is black, with broad stripes of white running lengthwise. These animals burrow and are active at night. They feed on mice, salamanders, frogs and eggs of birds that nest very low. Sometimes they rob hens' nests, but this is by no means the rule. They are of positive benefit to the farmer on account of the large number of beetles, grasshoppers and field-mice which they destroy. Ordinarily they do not run at the approach of man, but, conscious of the protection of their nauseous secretion, move away deliberately. They can eject this fluid at will eight or 12 feet. They prowl around chiefly at dusk and after dark. They are quite bold and fearless, coming close to camp and dwelling, a pair often taking up abode under barn or porch. The flesh is said to be white and sweet. Owing to the present scarcity of the more valuable fur-bearers, the fur of the skunk is now extensively used, and in the market goes under the name of Alaska sable.

Skye (*skī*), the largest island of the Hebrides, off the west coast of Scotland. It is 49 miles long and from seven to 25 broad. It is mountainous, with a few tracts of pasture and one large plain. The highest peak of the mountains, called Coolin Hills, is 3,234 feet high. Lake Coruisk, the "dread lake" of Scott's *Lord of the Isles*, and Glen Sligachan thought to be the grandest glen in Scotland, with columns and cliffs over 1,000 feet high, with waterfalls leaping over them and deep caves at their foot, are among the interesting scenery. Fish abound, and with potatoes form the main diet of the people and also furnish the principal industry. The inhabitants (who chiefly are crofters) are principally Celtic, speak Gaelic, and number 14,608. The principal proprietors are Lord Macdonald and MacLeod of MacLeod. Consult Smith's *A Summer in Skye*.

Sky'lark, an European bird that mounts high in the sky and sings on the wing. It is the lark of the poets. The larks of America belong to a different family. See LARK.

Sladen, Douglas (Brooke Wheelton), was born in London, England, on Feb 5, 1856, and educated at Trinity College, Oxford, becoming first professor of history in the University of Sydney, N. S. W., spending four years in that colony. He has travelled extensively and published much about the countries he has seen, being an extensive contributor to Australian literature. In this connection may be mentioned *Australian Lyrics*, *Poetry of Exiles*, *A Summer Christmas*, *Australian Ballads*, *A Century of Australian Song* and *Australian Poets*.

Slate. See SHALE.

Sla'ter, Samuel, an Englishman who introduced the manufacture of cotton into the United States, was born at Belper, Derbyshire, in 1768, and died at Webster, Mass., in 1835. Slater was an apprentice under Strutt, the partner of Arkwright. When he quitted England (1789), he did so secretly for fear that efforts might be made to prevent him from introducing Arkwright's machinery abroad. Relying wholly upon his memory, however, he did so; and in 1790 he succeeded in founding the first American cotton-factory at Pawtucket, Rhode Island. He afterwards built mills at Webster, Mass. The town of Slaterville grew up from the homes of his workmen. In 1816 Slater also built woolen mills at Webster, Mass. He was a liberal and philanthropic employer and the founder of schools for the children of his workmen.

Sla'very, the condition of a man who belongs to a master, who has the right to employ him and treat him as he pleases. It probably arose first from captives made by war. It was general among ancient nations, including the Jews. In Greece slaves were employed not only for domestic service, but as bakers, tailors, seamen, miners, soldiers and police. They usually were mildly treated and were often freed. A slave was not allowed to wear his hair long or to enter the gymnasia and public assemblies, but could appear in the temples and at festivals. At one time there were 200,000 slaves in Attica, three times the number of the freemen. Roman slavery was very severe, as is seen by their gladiatorial combats. Old and useless slaves were often left to starve on an island in the Tiber. The cruelty of the masters was gradually softened by the law, a very cruel one being obliged to sell his slaves. The slave could not own property, though sometimes allowed a small portion of his gains when in trade, and could not testify in the courts. In Britain the Anglo-Saxons made slaves of the Celts and other natives, and had a regular trade with the continent in Irish slaves; but with the Norman conquest slavery was merged into serfdom. The traffic in slaves continued among Mohammedan nations, Christian captives being sold as slaves in the markets of Asia and Africa. The Barbary corsairs, down to 1812, carried off large numbers from the coasts of Europe into slavery. Cervantes, for five years a slave, reports 25,000 Christian slaves in Algiers alone. During the middle ages in Europe the class called serfs were, practically, slaves. They were usually attached to the soil and could be transferred with the land they tilled. They could not hold property, but their oath was taken in evidence and, if injured, they were protected by law.

Serfdom died out in England and in Scotland gradually, a curious form remaining in Scotland to the end of the 18th century. Colliers and saltworkers were bound by law, on entering a coal-work or salt-mine, to life-service there; their labor was transferred with the ground; and their sons could follow no other trade nor seek employment in other mines. In France the Revolution swept away the last remains of serfdom, and in Italy it had ended in the 15th century. It was abolished in 1781 in Bohemia and Moravia, and entirely destroyed in Prussia by the reforms of the 19th century, though the mass of the peasants had been free since the end of the 13th century, while Russia put an end to the system in 1861.

Negro slavery of modern times was a result of the discovery of America, the Spanish introducing them first into the New World to work their mines and plantations. They were first used to any extent in Haiti, in San Domingo. Sir John Hawkins was the first English slave-trader, followed by others, until England had carried to America 300,000 slaves between 1680 and 1700, and 610,000 into Jamaica alone between 1700 and 1786. The slave-trade was very inhuman, the negroes being so crowded on the ships that a large proportion died on the passage. The first efforts to restrain slavery were made to stop the slave-trade. In 1787 a society for this purpose was formed in London, with such supporters as Clarkson, Wilberforce, Zachary Macaulay and Sharp. After years of struggle the abolition bill, making all slave-trading by British subjects illegal after Jan. 1, 1808, became a law on March 7, 1807. The movement continued until, on Aug. 28, 1833, an emancipation bill was passed giving freedom to all slaves in the British colonies. Slavery was abolished in the French colonies in 1848, in the Dutch ones in 1863 and in Brazil in 1888.

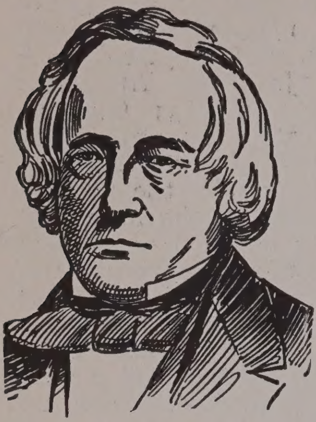
When the American colonies became the United States in 1776, there were 300,000 slaves in the country, and in 1790, at the taking of the first census, they numbered 697,897, and were in all the states except Vermont and Massachusetts, to which Maine then belonged. The northern states gradually abolished slavery, Pennsylvania having 64 as late as 1840. In the south many, with such leaders as Washington and Jefferson, opposed slavery until the invention of the cotton-gin made it profitable and developed it, when even the renewing of the slave-trade with Africa, abolished by the United States in 1808, was advocated. The contest between the upholders and the opposers of the system, beginning in the north with the formation of societies for the gradual abolition of slavery and carried on by literature, lectures and, finally, political parties, was met in the south by demands for enlarged territory and national laws protecting their slave-property in the free states. The Pennsylvania Abolition Society was founded in 1775, with Benjamin Franklin as president, and the New York Society, with John Jay and Alexander Hamilton as leaders. In 1831 Garrison established *The Liberator*, the antislavery journal. The formation of a northern republic, free from slavery, was the hope of the extreme abolitionists, as the formation of a southern republic founded on slavery was the aim of the extreme proslavery party. The contest ended in the Civil War of 1861–65, in the course of which the proclamation of emancipation was issued by Lincoln, Jan. 1, 1863, setting free nearly 4,000,000 slaves, and confirmed in 1865 by an amendment to the constitution approved by 27 of the 36 states.

Slavery still exists, and the slave-trade is carried on by Arab slave-traders in the interior of Africa, the tracks of their caravans being whitened by the bones of those who have died on the journey, and by the Portuguese. The Congo Free State, the foundation of missions and the encouragement of trade by the British and German companies, with the help of all Christian governments, will, it is hoped, finally end the terrible traffic, in which over 90,000 000 Africans have been enslaved. Consult Clarkson's *History of the Slave-Trade* and Wilson's *Rise and Fall of the Slave-Power in America*.

Slavs (*slävz*) or **Slavonians** (*slȧ-vō'nĭ-anz*), the name of a group of nations belonging to the Aryan family, living in the eastern parts of Europe and northern Asia. The earliest history represents them as living around the Carpathian Mountains and spreading to the Baltic, the Elbe and over the whole peninsula between the Adriatic and the Black Sea. Since the 7th century they have become settled and gradually formed into independent states. There are two divisions, the southeastern and the western. The Russians, Bulgarians and Illyrians belong to the first division; the Poles, Silesians and Pomeranians, called Lechs, the Czechs or Bohemians and the Slavonic tribes of north Germany make up the western division. The only people that have preserved their language are the Wends or Serbs of Saxony and Prussia. The whole Slavonic population is about 100,000,000. They are represented by ancient writers as an industrious race, living by agriculture and having flocks and herds. The government, at first patriarchal, was gradually usurped by the chiefs and the people were reduced to serfs There was no middle class between the nobility and the peasants. See LANGUAGES and LITERATURE.

Slidell (*slī-dĕl'*), **John**, an American lawyer and politician, was born in New York

City about 1793, and died at London, England, July 29, 1871. After graduating at Columbia College, he studied law, and, removing to New Orleans practiced there and became a leader in Louisiana politics. From 1842 to 1845 he served in Congress as a state-rights Democrat. From 1853 to 1861 he was a member of the United States senate, and in the Civil War, when Louisiana seceded, he withdrew and was appointed Confederate minister to France. In company with James M. Mason, who was named minister to England, both were taken on the high seas by Captain Wilkes of the United States navy and brought as prisoners to the United States, where they were confined in Fort Warren. On the demand of England they were released, however, and proceeded on their respective missions. In France, aided by the sympathy of Napoleon III for the Confederate government, Mr. Slidell, though unable to secure recognition for his government, procured a ship, the *Stonewall*, for the Confederacy, and negotiated with French capitalists for a loan of $15,000,000. After the war closed, Mr. Slidell settled in England and resided there until his death.



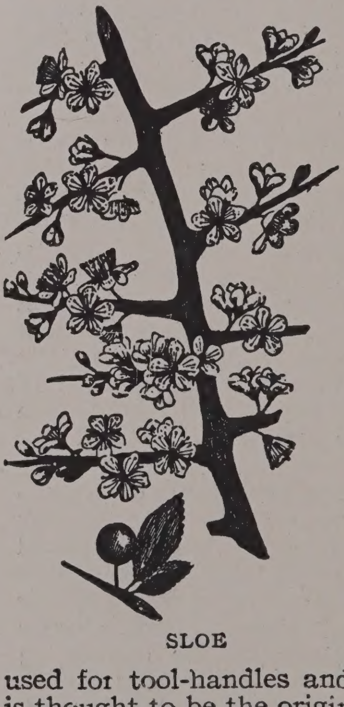
JOHN SLIDELL

Slime-Moulds. See MYXOMYCETES.

Sloane, William Milligan, American educator and author, was born at Richmond, O., Nov. 12, 1850, and graduated at Columbia College in 1868, continuing his studies at Leipsic and at Berlin. At Berlin he acted at the same time as secretary to George Bancroft, then United States minister to Germany, aiding him in his historical work. From 1876 to 1883 he was assistant and professor of Latin at Princeton University, and from 1883 to 1896 occupied the chair of history, with intervening visits to Europe. Since 1896 he has been Seth Low professor of history at Columbia University, New York City. He has also been editor of the *New Princeton Review* and one of the conductors of the *American Historical Review.* Among his writings are the *Life of Renwick Sloane* (his father), *The French War and the Revolution, Life of James McCosh* and *Napoleon Bonaparte, a History.*

Slo'cum, Henry W., American general, was born on September 24, 1827, at Delphi, Onondaga County, N. Y. He graduated from West Point in 1852 and was assigned to the 1st artillery, with the rank of second lieutenant. After promotion to first lieutenant in 1855, he resigned in 1856, practiced law at Syracuse, and was elected to the legislature in 1860. On the outbreak of the Civil War he was commissioned as colonel of the 27th New York volunteers and took part in the first battle of Bull Run. In August he was made a brigadier-general, taking part in McClellan's peninsular campaign in 1862. He distinguished himself at the battles of Gaines' Mill, Glendale and Malvern Hill and was promoted to major-general of volunteers He fought at second Bull Run, South Mountain and Antietam, and as commander of the 12th corps rendered signal service at Fredericksburg, Chancellorsville and Gettysburg. Later he was transferred with his corps to the army of the Cumberland, succeeded to the command of the 20th corps, and was the first to enter Atlanta. In Sherman's march to the sea and through the Carolinas he commanded the left wing, taking part in the actions of that campaign. After the war he took up the practice of law at Brooklyn and was elected to Congress in 1870 and 1884. He died at Brooklyn, N. Y., April 14, 1894.

Sloe, a wild plum, also called blackthorn. It is a shrub growing from four to ten feet high though sometimes forming a small tree. The branches end in sharp points or spines. The flowers are white, appearing before the leaves. The fruit, about the size of large peas, is sometimes made into preserves, but is bitter and little used. The leaves resemble tea leaves and have been used to adulterate tea, and the juice is used in making an inferior port-wine. The wood takes a fine polish and is used for tool-handles and canes. The sloe is thought to be the original of all the European varieties of the plum.



SLOE

Slot-Machine', a familiar, mechanically adjusted contrivance for vending chocolate, caramels and other sweets, and popularly known as nickel-in-the-slot or penny-in-the-slot machines, at railway stations, hotels, seaside or other places of public resort. They are variedly arranged, but the usual device is that when the would-be purchaser of the commodity or commodities offered for sale drops a coin into the slot and turns a handle the commodity is released and the coin falls into a receptacle, to be afterwards collected by the vendor's agent. Somewhat similar contrivances also are in use as weighing-machines, a pointer indicating the weight of the person, who, after dropping a coin in the slot, steps on the machine-platform to be weighed.

Sloth, any one of a group of sluggish mammals living on trees in the forests of Central and South America. Their limbs end in hook-like claws, and they are the most strictly tree-inhabiting of all animals. They usually cling to branches with their backs downward. They crawl with difficulty on the ground and rarely descend to it. They are covered with long, coarse hair, the shafts of which are roughened or fluted. This hair is naturally grayish, but in the damp forest it is covered with a growth of algæ, imparting a peculiar green color which makes the animal difficult to distinguish among the foliage. The algæ disappear in a dry climate, and the hair resumes its natural color. They feed upon leaves, young shoots and fruit. They are silent, inoffensive animals and move mostly at night. About ten species are known. Fossil sloths of colossal size have been found in the rocks.

Sloyd. In Sweden *sloyd* or *slöjd* originally meant any kind of trade. In 1872 the Swedish government perceived that, owing to the spreading of the factory-system, *hem-sloyd* or the home industries of the people was declining, and it therefore sent men round the country to lecture upon these industries. At the same time the Naas school was established by Otto Salomon to give children training in these trades. In this school the educational value of sloyd was recognized, and in consequence the Swedish government introduced sloyd into the public schools as "a system of educational manual-training in which wood is the material employed." The Sloyd Training-School was started at Boston as a private institution in 1888. Until 1896 sloyd was discussed at most meetings of the National Educational Association. A good series of models and outlines of sloyd courses is given in the proceedings of the N. E. A. for 1894, pp. 267–8. But, later, it was apparent that the American idea of manual training so naturally leads to the adoption of the sloyd principles that there was no reason to speak of it as a separate system. As above pointed out, the sloyd methods have also been so modified as to approximate the broader system of manual training which now prevails in this country. The influence of the sloyd movement was undoubtedly needed at the time it was felt. See Manual Training.

Slug, a land-snail of elongated form, with a small rudimentary shell, either covering the lungs and heart or entirely absent. These animals have feelers with eyes at the extremities, as in the common snail, but the body is not coiled. The shell when present is a small flattened plate usually concealed in the mantle. Some of the common forms reach in length from two to four inches. They often live in cellars. They live concealed under boards and other objects during the day, but are active at night, feeding mainly on vegetables. In Europe they have caused great injury to garden crops. They hide their eggs cunningly in the roots of plants, in crevices and in protected nooks; they would multiply alarmingly if it were not for bird-enemies and an insect that destroys their eggs. The name is applied also to larvæ, as the rose-slug, the larva of a saw-fly, and to various soft-bodied insects.

Small Pox (*variola*), a contagious disease affecting persons of all ages. It was known in Asia in earliest times, and has since spread throughout the world. This disease being exceptionally contagious, severe methods are necessitated to prevent its spreading especially during times of epidemics. Cities prevent the diffusion of an epidemic of small pox by vaccination, quarantine, and sanitation. The number of deaths of those who have been vaccinated is about 5 per cent; of those who have not been vaccinated, 37 per cent. Unlike diphtheria, which may be treated with antitoxin after the appearance of the disease, small pox is best treated by vaccination to prevent contraction. The symptoms appear about twelve days after exposure, with headache, pains in the back, chills, and a rather high fever. A day or so following, a prodromal or preliminary rash may appear, but will vanish. On the third day, small, hard, red pimples appear on the face, spreading downward. The fever will now drop nearly to normal. After a day or so the pimples become filled with a watery fluid; about five days afterwards the fluid has turned to pus, and the pimples are dented in the center. The temperature now rises again, as the pus is being absorbed in the body, sometimes so high that the patient becomes delirious. During the next week the pus gradually drys up, leaving scabs.

Clothing and all articles coming in contact with the victim should be thoroughly disinfected or burned, as well as all secretions. The treatment is generally limited to relief of pain, and fever. The patient should never scratch the pimples, no matter how much they may itch, for if the pustules reach the true skin beneath the surface, pockmarks result.

Smell, the sense that perceives odors. The nerves of smell are an extension of the brain, and are unaffected by any other sort of impression. From the olfactory lobes of the brain they are distributed to the upper part of the nose. The odorous matter is dissolved in the mucous membrane of the nasal cavity, and if the odor is to be noticed there must be a passage of air through the nose and the membrane must be moist. If one stops breathing, odors can not be noticed. The delicacy of this sense is remarkable; for one thirty-three-millionth of a grain of musk can be detected. When an odor acts on a nerve of smell, it first stimulates it, but if the influence continues long, the stimulus ceases and the nerve ceases to distinguish the smell. The strength or sensitiveness of the sense of smell varies with different animals. In some animals, as the dog, it is wonderfully developed, but in man it often demands confirmation from other senses. Flesh-eating animals are more sensitive to the odor of other animals than are animals that live on vegetation, and these are more sensitive than those to the odor of plants. Only gaseous or vaporous odors are recognized. Some people are so sensitive to odors that roses, new-mown hay or goldenrod inflames the passages of the throat, nose and eyes, causing rose fever or hay-fever.

Smelt, a small fish closely related to the salmon, but usually placed in a distinct family. On the American Atlantic coast two species, one more northern than the other, extend from the Arctic to Virginia. They are each about 12 inches long and silvery in color. When fresh, they have an odor resembling cucumbers and are highly prized as food. Other similar forms occur in Europe and along the Pacific coast of the United States.

Smiles, Samuel, a Scottish writer, was born at Haddington in 1812. He studied medicine at Edinburgh and practiced at Haddington and at Leeds, finally becoming editor of the Leeds *Times*. Here he met George Stephenson, which led to writing his life in 1857. His book, *Self-Help*, followed, and at once was a success, which has continued, the sales reaching 150,000 copies and the translations being made in 17 languages. Some of his other works are *Character*, *Thrift*, *Duty*, *Lives of the Engineers*, *Men of Invention*, *The Huguenots in France*, *The Huguenots in England* and *Industrial Biography*. He died at London on April 17, 1904.

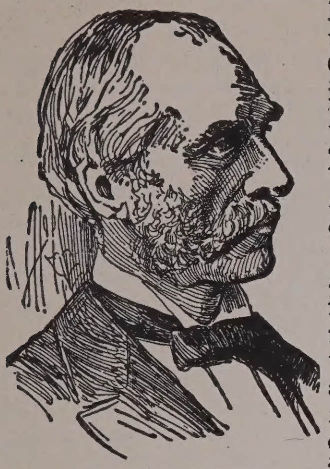
Smith, Adam, a Scottish philosopher, was born at Kirkcaldy in Fifeshire, on June 5, 1723. He studied at Glasgow and at Oxford, and was made professor in the University of Glasgow. He published his *Theory of Moral Sentiments* in 1759 and, later, a *Dissertation on the Origin of Languages*, both of which had great vogue in their day. But the work which gives him his reputation and makes him the founder of the science of political economy was his *Inquiry into the Nature and Causes of the Wealth of Nations*, published in 1776. Its clear style, startling doctrines and curious facts made it popular at first; but, when it was seen how contrary its principles were to the old ideas of things, it was vigorously opposed. After the French Revolution and the excitement attending it had passed by the book became the leader of a great host of literary works based upon it. Smith became lord-rector of Glasgow university in 1787, and died at Edinburgh, July 17, 1790. Consult Farrer's *Life* in the English Philosophers Series and Haldane's in the Great Writers Series.

Smith College, at Northampton, Mass., was founded in 1871 by Miss Sophia Smith, of Hatfield, Mass., who donated about $365,000 for the purpose. It is a college for women, providing courses of study and facilities for education equal to those which are afforded in the best colleges for young men. It stands in the first rank among colleges for women. It has a faculty of 165 and an attendance of 1,708 students, with a library of 49,000 volumes.

Smith, Edmund Kirby, a Confederate general, was born at St. Augustine, Fla., in 1824. He was professor at West Point and a major in the United States army. In the Confederate service he became lieutenant-general in 1862 and general in 1864. He was made commander of the trans-Mississippi department in 1863, and so managed it as to make it self-supporting. He invested Cincinnati in the autumn of 1863, but withdrew when the veterans under Sigel entered the city. At the close of the war his forces were the last to surrender. He was president of the Atlantic and Pacific Telegraph Company from 1866 to 1868, chancellor of the University of Nashville from 1870 to 1875, and afterwards professor in the University of the South at Suwanee, Tenn. He died there on March 28, 1893.

Smith, Francis Hopkinson, American artist and author, was born at Baltimore, Md., Oct. 23, 1838, and as a youth studied and for some years was actively engaged in, mechanical engineering. In the latter capacity he performed considerable work under contract for the United States government. Mr. Smith, however, made his chief reputation as a water-color painter, among his more notable pictures being *In Darlink Wood*, *In the North Woods* and *A January Thaw*. In literature he also achieved a wide reputation, as well as an illustrator. Among his works are *Old Lines in New Black and White; A White Umbrella in Mexico; Colonel Carter of Cartersville; American Illustrators; Venice; Gondola Days;* and many more. He died April 7, 1915.

Smith, Gold'win, an English scholar and writer, was born at Reading, Aug. 13, 1823. He studied at Eton and Oxford and was elected a fellow of University College. From 1858 to 1866 he was professor of history at Oxford. During the Civil War in the United States he wrote pamphlets in support of the north, and in 1864 lectured in the United States. He was appointed professor of English and constitutional history at Cornell University in 1868. Since 1871 he has lived in Canada, where he edited the *Canadian Monthly* and founded and edited *The Week* and *The Bystander* His writings, which are marked by vigorous thought, incisive and brilliant style, remarkable powers of compressing much into little space, great lucidity and high interest, embrace *Irish History*, *Lectures on the Study of History*, *Three English Statesmen*; *The United States* (1492-1871); *The United Kingdom*. biographies of *Garrison*, *Cowper* and *Jane Austen*, and numerous other works. He died June 7, 1910.



GOLDWIN SMITH

Smith, Henry Boynton, an American theologian, was born at Portland, Me., in 1815. He studied at Halle and at Berlin, Germany, after finishing his theological studies at Andover and at Bangor. He was a professor of philosophy at Amherst College, and of church-history and later, of theology at Union Theological Seminary in New York City. He held this position 20 years, which, with translations of works on church-history, made him one of the first theologians of the Presbyterian church. He died at New York, Feb 7, 1877

Smith, Captain **John,** the founder of Virginia, was born in Lincolnshire, England, in 1580. He traveled in France and the Low Countries, and, when on his way to join the Christian army fighting against the Turks in Hungary, was robbed by four adventurers. He joined a ship, half merchant and half pirate, and helped to capture a Venetian argosy. He distinguished himself in the service of Ferdinand, Duke of Austria, was next sold as a slave, but escaped and traveled through Germany, France, Spain and Morocco. In 1605 he joined an expedition of three vessels and 105 men, to found a colony in Virginia. On the way out he was accused, by the leaders, of a conspiracy to make himself king of Virginia and was kept a prisoner on the voyage. Jamestown was founded on James River in April, 1607. Smith, after being tried and acquitted, was made a member of the council, and was the real head of the colony, saving it from destruction. On one of his journeys into the country for corn he was captured by the Indians under Powhatan, their chief, and his life saved by Pocahontas, the chief's daughter. The story, however, has been doubted by late writers. On his return to Jamestown he found the colony reduced to about 40 men, who were anxious to return to England, but were induced by Smith to remain until others arrived. He explored Chesapeake Bay in two voyages, traveling about 3,000 miles and making a map of the country. He was superseded in 1609 as governor by Lord Delaware, and returned to England. In 1614 he explored the coasts of New England, making a map of the country, which he presented to Prince Charles. He undertook the founding of a colony in New England in 1615, but his vessel was captured by a French war-ship, and he was carried to La Rochelle. After his escape he wrote an account of his voyages to New England. He also wrote *General Historie of Virginia, New England and the Summer Isles* and the *True Travels, Adventures and Observations of Captain John Smith.* Consult *Life* in Sparks' "American Biography." He died at London, June 21, 1631. See POCAHONTAS.

Smith, Joseph, Jr. See MORMONS.

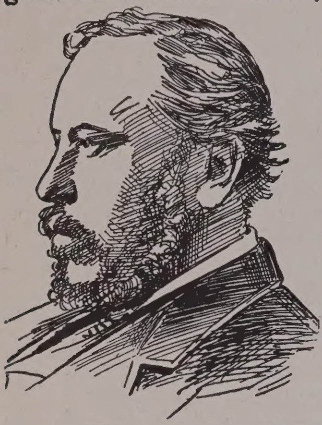
Smith, Samuel Francis, an American clergyman, was born at Boston, Mass., in 1808. He served as pastor of Baptist churches in Waterville, Me., Newton and Boston, Mass., and edited *The Christian Review* and other Baptist periodicals. He is known as the author of several hymns, but especially of the national hymn, *My Country 'tis of Thee*, which he wrote in 1832, while a theological student at Andover. A Baptist hymn-book contains 27 of his hymns. He died on Nov 16, 1895. Dr. Holmes said of him "Fate tried to conceal him by naming him Smith, but he shouted a song *My Country, of Thee.*"

Smith, Syd'ney, an English author, was born at Woodford, Essex, June 3. 1771. He studied at Oxford and was curate at Netheravon where he became tutor to a young man intending to study in Germany, but the war prevented and sent them to Edinburgh. Here, in 1802, with Jeffrey, Horner and Brougham he started *The Edinburgh Review*. writing 18 articles in the first four numbers. He next lived six years in London, where he made his mark as a lecturer on philosophy, a preacher and a brilliant talker. He was made rector of Combe Florey in Somerset and a prebendary at St Paul's, London. He wrote 65 articles for *The Edinburgh Review; Peter Plymley's Letters* in favor of Catholic emancipation; and letters and pamphlets on the ballot, the game-laws, prison abuses etc. He is best known, however, as a wit and the creator of "Mrs. Partington." He died on Feb. 22, 1845. See *Life* by Holland and Reid's *Times of Sydney Smith.*

Smith, Sir **William,** an English classical scholar and for many years editor of *The*

London Quarterly Review, was born at London in 1812 and died on Oct. 7, 1893. His name will be familiar to most students by his many compilations — chiefly by his *Dictionary of Greek and Roman Antiquities; Dictionary of Greek and Roman Biography and Mythology; Greek and Roman Geography; Latin-English Dictionary; Dictionary of the Bible; Dictionary of Christian Biography;* and *Dictionary of Christian Antiquities.*

Smith, William Robertson, a distinguished Scottish divine, biblical scholar and orientalist, was born at Keig, Aberdeenshire, Nov. 8, 1846, and died at Cambridge, England, March 31, 1894. Educated at Aberdeen University, he studied theology at Edinburgh, at Bonn and Göttingen, and was elected to the chair of Hebrew and Old Testament exegesis at the Free Church College, Aberdeen. While here, he contributed articles of an advanced character on the Bible for the *Encyclopædia Britannica* adverse to the "standards" of the Free Church, which provoked much controversy and led to a prosecution for heresy. Owing to a skillful and powerful defense and to the spread of broader views of biblical criticism and of the latitude allowed a writer on questions of interpretation, the trial was inconclusive, though subsequently (in 1881) he was removed from his chair, but left with its emoluments. This occurred in consequence of Professor Smith's later articles for the *Britannica* on the Hebrew language and literature. During his suspension he traveled in Egypt and Arabia, and on his return he became associated with Prof. T. Spencer Baynes in the editorship of the *Britannica.* In 1883 he became lecturer on Arabic at Cambridge and subsequently professor at that university. The works of this fearless investigator and writer embrace *The Old Testament in the Jewish Church*, *The Prophets of Israel*, *The Religion of the Semites*, *Fundamental Institutions*, *Kinship and Marriage in Early Arabia* and *Isaiah* for Professor Perowne's *Cambridge Bible for Schools.*


WILLIAM ROBERTSON SMITH

Smith, Sir **Will'iam Sid'ney,** the hero of Acre, was born at Westminster, England, July 21, 1764. He entered the navy at 11, and was made lieutenant when only 16 for his courage at Cape St. Vincent. From Constantinople in 1798, learning that Bonaparte was about to attack St. Jean D'Acre, Syria, he hastened there in command of a squadron. He captured the enemy's vessels in March, 1799, and held the town until Napoleon raised the siege, leaving his guns behind. His death occurred at Paris, May 26, 1840. See *Life* by Barrow.

Smith'field or **Smooth'field,** is an open space of nearly six acres in London, England, and has for centuries been used as a market for sheep, horses, cattle and hay. It was outside the city-walls, and could be used for jousts, tournaments and executions. The well-known Bartholomew fair was held here; Wallace the noble Scotch patriot was executed here by Edward I; Wat Tyler, with 30,000 peasants, here met Richard II and was stabbed by the mayor of London. It is best known, however, as the place of execution of the long line of English martyrs from 1401 to 1612. The cattle-market, well-described in *Oliver Twist*, was closed in 1855. The hay-market still occupies part of the space, but the center is laid out as a garden with fountains.

Smithso'nian Institu'tion, a scientific establishment, which was organized by Congress in 1846 to carry into effect the will of James Smithson, an Englishman, born in 1765, who devoted his life to scientific pursuits and bequeathed his estate of $515,169 to the United States, to found "at Washington an establishment for the increase and diffusion of knowledge." The original bequest has, through subsequent additions, reached the amount of $900,000, to the interest upon which Congress adds an annual appropriation of about $20,000. The institution is governed by a board of regents appointed by the government. It has large and beautiful buildings, filled mainly with the national collections. The principal work of the institution is in the direction of original research, Professor Henry, the first secretary, making the rule that nothing should be undertaken by it which could be done as well somewhere else. Its library of 100,000 volumes has been united with that of Congress, and its art-collection was transferred to Corcoran Art-Gallery. In its buildings are the national museum, a bureau of ethnology and a bureau of international exchange; and connected with it are a national park and an observatory. It publishes *Smithsonian Contributions to Knowledge*, *Miscellaneous Collections* and an annual report. It carries on communication between the library and scientific associations in Europe and America, and has a vast correspondence with all parts of the world.

Smoke, the vapor produced by burning any substance, usually wood or coal. The smoke from burning wood is almost colorless, and consists mainly of carbonic acid and water, while that from burning bituminous coal is darker, being mixed with an oily vapor and soot or finely divided carbon. The more perfect the combustion, the less smoke; and the great effort in large cities to remove the smoky atmosphere which results from the large amount of smoke coming from factories, foundries and innumerable fires is mainly in the direction of perfecting the combustion of the coal used. If coal is heated in a close vessel, the oil, tar and gas formed in the combustion are all driven off consumed, leaving a coke which burns with a smokeless flame, as does also anthracite, which has lost the original volatile matter of the coal by natural processes.

Smoll'ett, Tobias George, a Scotch historian and novelist, was born at Dalquhurn, in 1721 He studied medicine and served an apprenticeship with a doctor and apothecary, afterwards obtaining a medical degree. He went to London in 1739 and attempted to stage his tragedy of *The Regicide*, but failed, and went as surgeon's mate on *The Cumberland*, which took part in the expedition to Carthagena in 1741. Both these experiences he describes in *Roderick Random*. His first publication was *Advice, a Satire*, in 1746. *Roderick Random* appeared in 1748 without his name, and was a great success, as was also the *Adventures of Peregrine Pickle* in 1751. His *History of England* from the invasion of Julius Cæsar to 1748 was begun in 1756, four volumes being written in 14 months. The continuation of the history, bringing it down to 1764, is better known than the first part, forming the continuation of Hume's history. His *Travels through France and Italy* were written after a two years' sojourn on the Continent. In Monte Novo near Leghorn, Italy, where he had gone for his health, Smollett wrote his last and best novel, *Humphrey Clinker*, which was published in 1771. He lived only long enough to hear the first rumors of its success, dying on Oct. 21, 1771. See Hannay's *Life* in the Great Writers Series.

Smug'gling is bringing goods liable to duty into a country without payment of the government dues; it also is the evasion of taxes on goods by illegal or secret manufacture. Smuggling was carried on largely in early times in England and on the Continent, and the stories of the adventures of those engaged in it form a large part of old romances, as in Scott's *Guy Mannering* and *Redgauntlet*. Tea, brandy, silks and tobacco were the articles brought into England by smuggling, at one period half the silks sold paying no duty and three fourths of the tobacco used in Ireland escaping the tax. The introduction of free trade in England made the business unprofitable. The enormous coast of the United States makes the evasion of custom-duties easy, and the long frontier on Canada and Mexico also offers opportunities of introducing contraband goods; but smuggling is carried on largely through the regular channels of trade and under the eyes of the custom-house inspectors, in spite of very careful watching The schemes for carrying it on are innumerable, women being especially skillful in their evasions. Goods are concealed about the person, as in the hair and in false calves on the legs, in canes and secret pockets and quilted into skirts or vests. Seizures of large amounts are often made, but the hope of success and the profits of one successful venture keep up the practice. The illegal manufacture of spirits has been carried on mainly in the mountainous districts of the south, and the adventures of the revenue-officers in those regions afford considerable material for romance.

Smut (in plants), a common disease of the grains of many cereals, as corn, rye etc., caused by the presence of a parasitic fungus. See ÆCIDIOMYCETES.

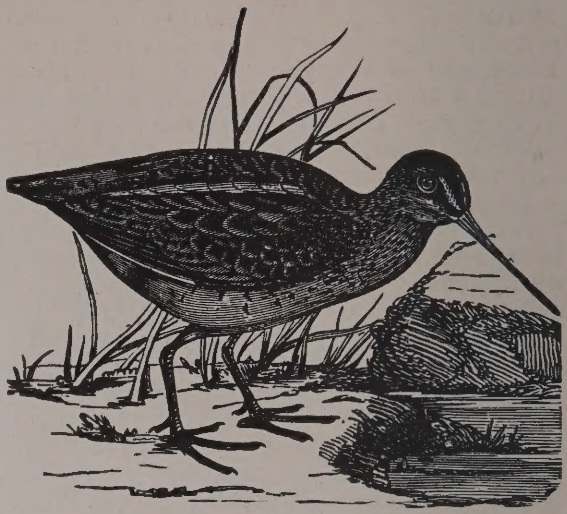
Smyrna (*smẽr'nȧ*), an important seaport in Asiatic Turkey, at the head of the Gulf of Smyrna. The gulf runs inland from the Ægean Sea for 46 miles. The city climbs up the slopes and nestles at the foot of a steep hill, on the summit of which are the ruins of the ancient Greek Acropolis. Its population of 350,000 contains a large Turkish element, though numerous other races are represented. It has manufactures of carpets, cotton and woolen goods, pottery, iron-foundries and machine-shops. Its importance, however, is from its commerce, as it has the largest part of the trade of Asia Minor with Europe. It exports raisins, figs, opium, carpets, sponges, licorice, olive-oil, tobacco, walnut-wood, emery and poppy-seed; and imports cloths, timber, iron, butter, cheese, petroleum, glass and paper. There is a fine harbor, which is entered annually by over 1,600 vessels. Smyrna, originally peopled by Greek immigrants to Asia Minor, became Ionian before 688 B. C., and was one of the great trading-places of the east. The king of Lydia destroyed it in 630 B. C., and it was more than 300 years before it was rebuilt on a new site. Under the Romans it regained its importance, though rivaled by Byzantium, to whose emperors it belonged. Destroyed by Tamerlane in 1402, it was captured by the Turks in 1424.

Snail, a shelled mollusk belonging to the class *Gasteropoda*. The land-snails are widely distributed and well-known. They are air-breathers, and, feeding upon vegetation, do much injury in gardens. The animal is spirally coiled to fit into its shell. The lower part of the body, called the foot, can be protruded. There are four tentacles or feelers on the head, which can be shortened or extended at will. The longest pair have eyes in their tips. There are slender muscles attached to the apex of the shell and to the animal's foot, by means of which the animal is drawn into its shell. In dry weather or in winter the opening is often closed by a horny structure, called the *operculum.* There are an immense number of land-snails in tropical countries, of considerable size and bright colors. Some are tree-climbers and secrete a thread of mucous substance, by means of which the body is suspended like that of a spider by its thread. They are eaten as food, especially in Europe. There also are water-snails, some of which come to the surface to breathe air, while others are provided with gills. The common garden-snail has 135 rows of 105 teeth each, making 14,175 in all.

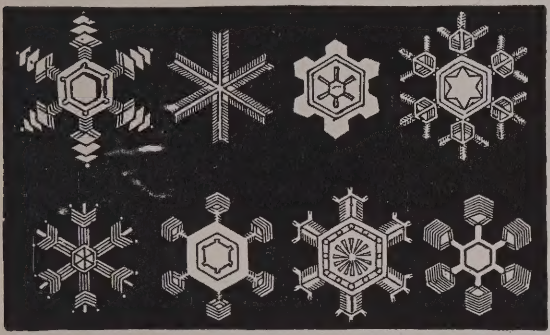
Snake River, the largest branch of the Columbia. It rises among the Rocky Mountains near Wyoming, and in crossing southern Idaho forms Shoshone Falls, and is a part of the northern boundary of Idaho. In southern Washington, as Lewis River, it joins the Columbia, having made a journey of 1,050 miles. It is navigable for only 160 miles

Snakes, the largest class of reptiles, the representatives having an elongated body covered with scales. They have no limbs and no rudimentary bones representing the shoulder-arch, but there is a trace of the arch of the hind limbs. They move by pushing the edges of the ventral scales against roughnesses, but can make no headway on a smooth surface. The bones of the skull and jaws are movable, so that the latter can be put on a stretch, which enables the snake to swallow animals larger than the normal size of the mouth and throat. Some possess poison-fangs with which their prey is killed, while others coil around their prey and crush it They shed their skins periodically, and the deserted skins are often seen in fields and woods. Some live entirely on land, though most snakes swim well, others climb trees, and in the Indian Ocean are snakes living habitually in the water. Most of them lay eggs, but a few, including the last-mentioned ones, bring forth their young alive. The snakes naturally fall into two groups — the nonpoisonous and the poisonous ones. There are about 700 species of nonpoisonous or colubrine snakes, which are found in nearly all parts of the world They are well-represented in the United States, and include such familiar forms as garter-snakes, blue racers, grass-snakes and blow-adders, all of which are harmless. The venomous snakes are represented in the United States by the rattlesnake family. There are about 60 species in this family, all American and renowned for their venom. Besides rattlers are included the copperhead and water-moccasin, the latter being the most dangerous of our snakes. The anacondas, boas and the like are powerful nonpoisonous snakes. All snakes are more abundant in warm and tropical countries. India is noted for venomous snakes, like the cobra, and the annual number of deaths from snake-bites there reaches nearly 25,000. See Boa, Cobra, Copperhead, Mocassin and Rattlesnake.

Snipe, a name given to a number of favorite game-birds belonging to a group of shore-birds. They grade into the sandpipers. There are about 100 species, and 30 of these visit the United States mainly during migration. A number of snipes, however, nest within the United States. Among the more widely known forms are the woodcock, jack-snipe, tip-up and Wilson's snipe. The jack-snipe is the pectoral sandpiper, and the tip-up the spotted sandpiper. The American woodcock is about 11 inches long, and variegated with black, brown, gray and russet colors. The European woodcock is similar, but considerably larger. The American bird frequents low, wet woods and in the autumn visits corn-fields and wooded hillsides. They probe for earthworms with their long bills, making holes in clusters. Wilson's snipe is about 11 and one fourth inches long, and is a favorite game-bird. It lives in fresh-water marshes and meadows. The tip-up or teter snipe is about seven and one half inches long, and has a white breast spotted with black. The jack-snipe is abundant during migrations. Snipes also abound in the Old World.


SNIPE

Snow is water floating in the atmosphere in a crystallized state. When a cloud of water-vapor reaches a temperature below 0° C., the process of freezing begins; and, if the air be calm, the crystals thus formed are large and regular. They are most easily observed by collecting them on a piece of black velvet and examining them with a lens. In the accompanying figure are shown the forms of some typical crystals, recently prepared from microphotographs by the United States Weather-Bureau. The whiteness of snow results from the total reflection of light, which occurs, sooner or later, when a ray of light enters any considerable body of snow from any direction. By the *snow-line,* sometimes called limit of perpetual snow, is meant the height above the sea at which snow does not melt, even in the hottest summers. This elevation varies greatly with latitude and with local circumstances. In general it diminishes with the latitude. The lower the latitude, the higher the snow-line. Snow does not, however, collect to an indefinitely great depth, even in regions which lie entirely above the snow-line; for the pressure soon reaches a point where the snow is compressed into ice and flows off as a glacier. Consult Tyndall's *Forms of Water* (International Scientific Series.)

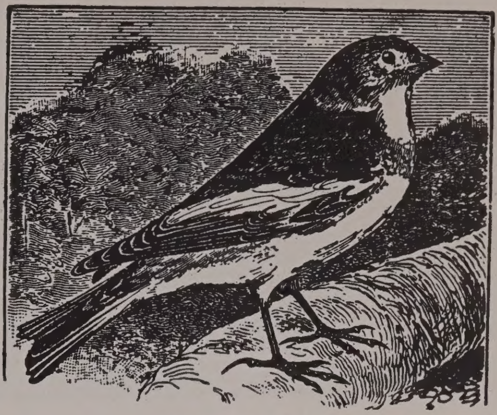


Snow'berry, a common shrub, native of North America, belonging to the honeysuckle family. It receives its name from its white, waxy berries, which remain on the bush after the leaves have fallen and make it an ornamental shrub.

Snow'bird or **Jun'co,** a sparrow-like bird very common in the United States during winter. They are about six and one half inches long, with the upper parts slate-gray and the lower parts whitish. They are often seen in flocks of ten to 50 on the ground near evergreens. They nest north of New England.

Snow-Bound, a poem by Whittier, was written, as he said, "to beguile the weariness of the sick-chamber." It was published in 1866. It is the best idyl of American rural life, delicate, spontaneous and true to nature and life. It pictures an old-fashioned American farm-home, simple, frugal and devout. A warmth of affectionate memory and religious faith permeates it; the lines on the death of the poet's sister are superb in beauty and pathos. The incidents of household-life and the unity and interdependence of a New England rural family in winter are so skillfully portrayed as to rank the poem with *The Cottar's Saturday Night* and *The Deserted Village*.

Snow'bunt'ing or **Snow'flake,** a bird about seven inches long, nesting in the far north and, in winter, visiting the United States as far south as Ohio River. In the breeding-season they are pure white, with black on their wings and tail and black feet and bill. The winter-plumage changes, and the white on the body is clouded with clear, warm brown, and the bill becomes pale. They appear in flocks on the ground and perch on fences, but rarely on trees. With the snow-birds they belong to the finch family.

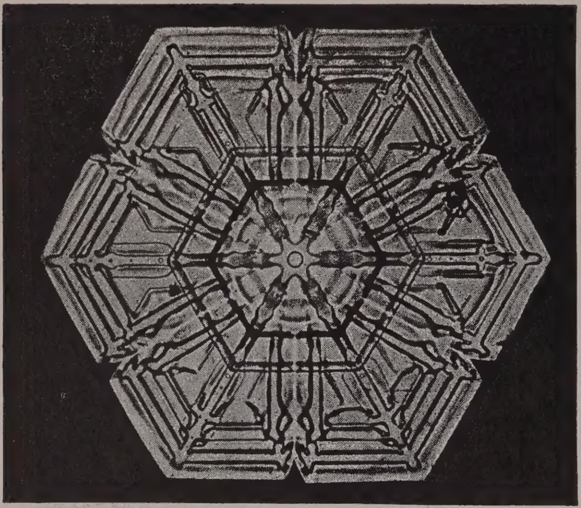


SNOWBUNTING

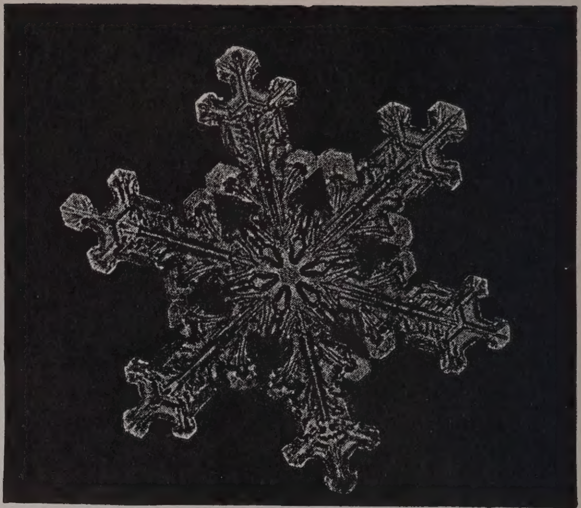
Snow'drop, a class of plants of the same order as the amaryllis. It is a spring-flower, with a white, drooping bell which gives its name, from its resemblance to a lady's earrings, or drops, as they were called in the 16th century. The root — a bulb — has two or three narrow leaves and a long stem with a single flower.

Snow'shoes, very broad, flat shoes, used in cold countries for walking on snow. The broad surface keeps the foot from sinking into the snow. The snowshoe worn in Canada is shaped somewhat like a tennis-racket, with a short handle, and is from three to five feet long and from one to two wide. It is a wooden frame with a leather covering, upon which the foot is fastened by thongs. The Norwegian snowshoe, called *ski*, is a wooden runner, about four inches wide and eight feet long, turning up in front.

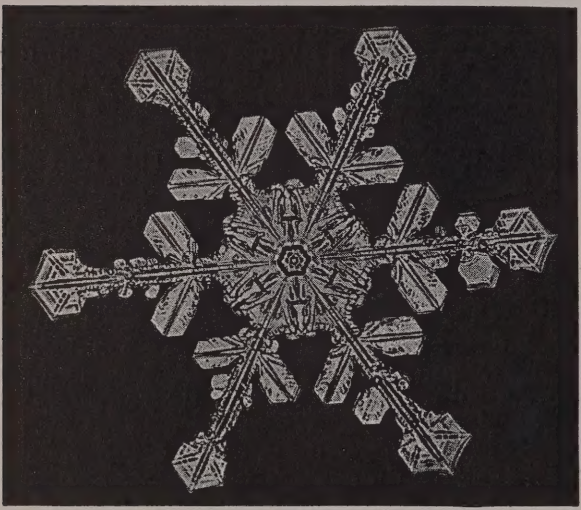
Soap is a compound of soda or potash and fat, potash making a soft soap and soda a hard soap. The principal fats used are tallow, lard, olive-oil and cocoanut-oil for hard soaps; besides these, linseed-oil, fish-oil and castor-oil are used in soft soaps. The distinctive property of soap is its power of cleansing, though to what it owes this power has never been decided. It will dissolve in water and in alcohol, and, when shaken in water forms a foam or lather. Soap is made by boiling the fat or oil with a solution of soda or potash, the length of time and the strength of the solution or lye varying with the kind of soap. Yellow soap usually contains rosin. Toilet-soaps are made of good yellow or curd soap, the finest being subjected to a process called milling. The soap is cut into shavings, dried a little, coloring matter and perfumes added, and then passed between granite rollers and afterward pressed into bars, from which the cakes are cut and stamped.



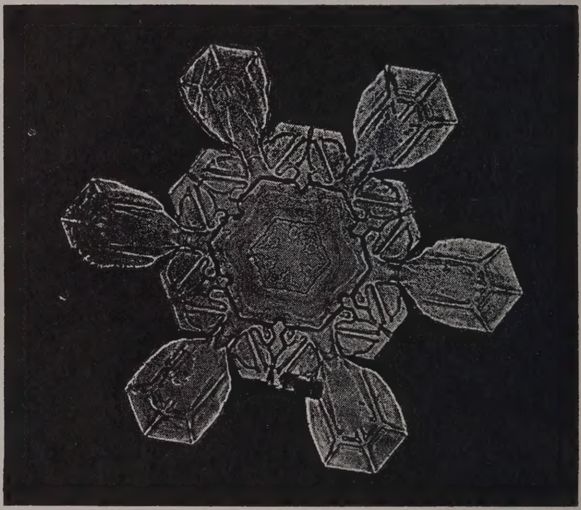
A RARE BEAUTIFULLY ETCHED CRYSTAL.



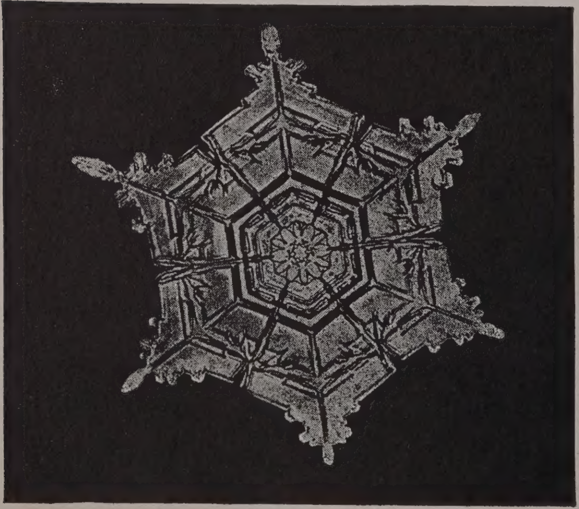
ELABORATELY ETCHED DESIGN.



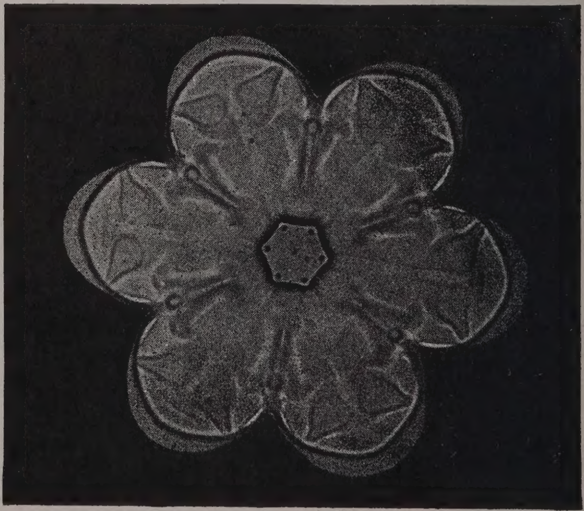
BEAUTIFUL STAR-SHAPED DESIGN.



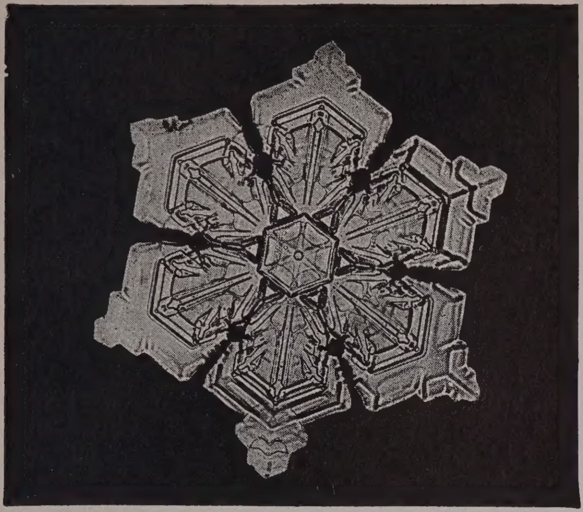
PRISM-LIKE CRYSTAL FROM HIGH ALTITUDE.



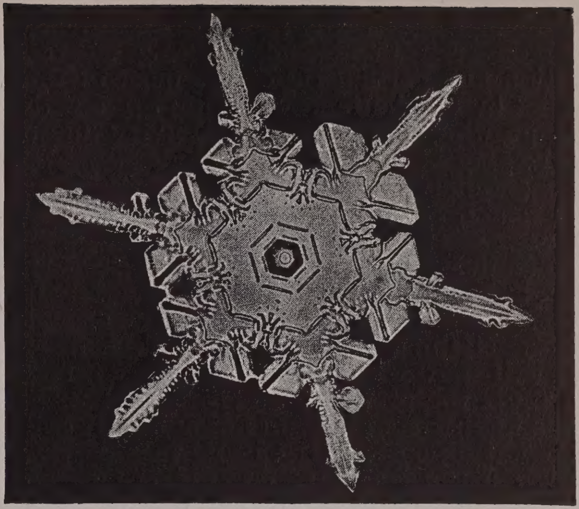
COLD HIGH ALTITUDE.



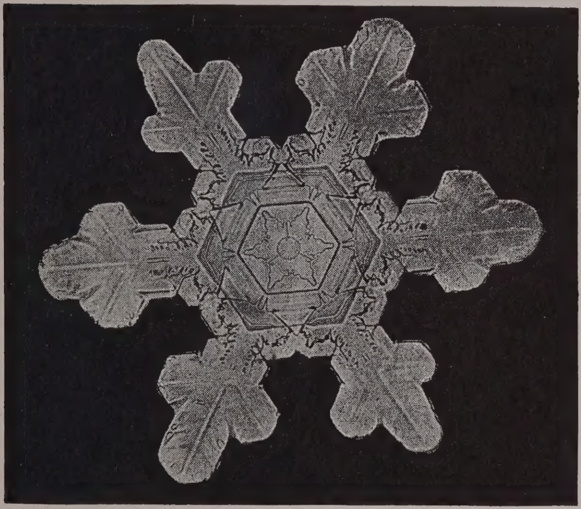
SOLID HIGH ALTITUDE CRYSTAL.



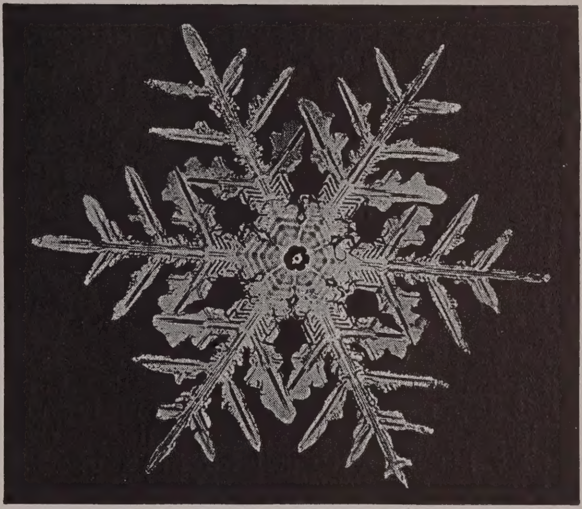
BEAUTIFUL HIGH ALTITUDE CRYSTAL.



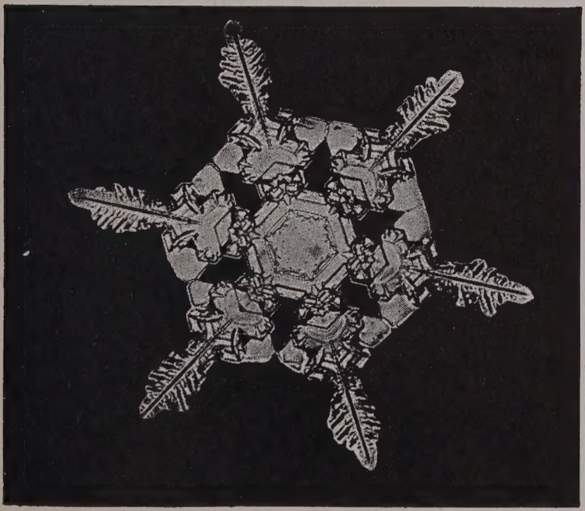
JEWELLED CENTER.



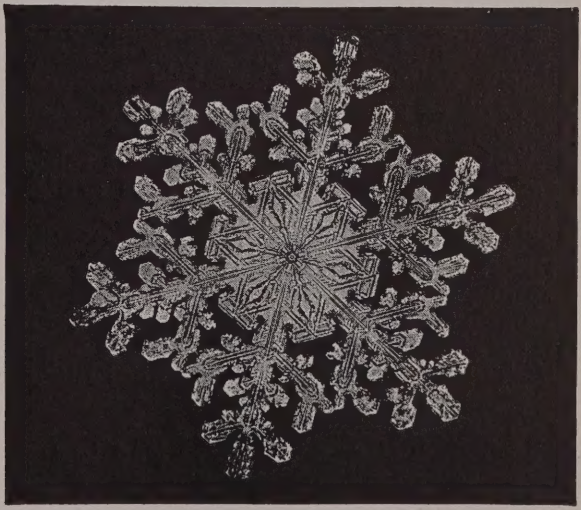
A BEAUTIFULLY ETCHED CRYSTAL.



FEATHERY LOCAL STORM TYPE.



LOW ALTITUDE TYPE.



HIGH AND LOW ALTITUDE COMBINED.

Transparent soaps are made by dissolving common soap in alcohol, pouring off the solution and getting rid of the most of the alcohol by distillation. Soap improves with age, growing harder and dissolving more slowly.

Soapstone. See TALC.

Sobieski, John. See JOHN III OF POLAND.

So'cialism is the theory that society should be reconstructed. The state, it holds, should own all property except wages, clothing, food, fuel and homes; direct if not operate all industries; and distribute the profits to all citizens. Socialism is neither communism nor anarchy, and does not oppose religion or the family, though many socialists do. It originated in 1808, its founders being Fourier and Saint-Simon in France, Robert Owen in England (1817) and Lassalle and Marx (1867) in Germany. The socialist movements of Saint-Simon, Owen and Blanc collapsed in 1848, but "Christian socialism" then originated in England with Maurice, Ludlow and Kingsley, the famous author of *Yeast*. Lassalle (1863) founded democratic socialism, called social democracy, and Marx created modern socialism. Though this now differs as to details and methods from his extreme views, it agrees on the whole with his principles, which are these:

Land and capital are the sources of subsistence and instruments of production. Labor gives them value. They should belong, not to individuals, but to society. Capitalists, people who possess wealth but do not labor, own land and capital and hire labor. The laborer must live. He has only his labor to sell for his support. So he is not free, really, but a kind of slave. Capitalists pay only enough to support him and his family, the future laborers, but take the value that he gives to property and products. This value belongs to the laborer, and should be paid to him. The state, therefore, ought to manage all industries and distribute their profits. Socialism claims that when this is done, society will be perfect, prosperity permanent and universal. It is gaining ground in Europe and Australasia. It aims to gain control of all governments by peaceful political action. See SYNDICALISM.

Social' Set'tlements. A social settlement is a group of people who have what is commonly called education and social training living among those who through poverty have less of those things, for the purpose of learning from them and of them, while teaching and helping in whatever way is possible. The benefits thus conferred on each class should also lead to the breaking down of class-distinctions. Inspired by Kingsley, Maurice and Ruskin, Arnold Toynbee, a tutor of Oxford University, in 1875 founded in Whitechapel, London, the first settlement. After a few years he died, but in 1884 Toynbee Hall was established in that part of London, where he had worked. In 1887 Stanton Coit, who had written *The Neighborhood Guild*, founded a club of that name in New York City, which embodied Toynbee's plans. In 1889 Hull House, the most famous of our social settlements, was established in Chicago under the direction of Jane Addams and Ellen C. Starr. Since then the movement has spread to all the chief cities of this country. In 1907 two splendidly equipped buildings were dedicated to this purpose: University House in Philadelphia and Pillsbury Building in Minneapolis, bearing witness to the continued life of the idea. There were, in 1905, more than 115 settlements in the United States, of which 30 were in New York City, 15 in Chicago, 14 in Boston and 5 in Philadelphia. About 100,000 people were connected in some way with the work of these settlements, and nearly that number were registered in the various classes conducted by them. In England there were 14 settlements in London conducted by and for men and the same number for the benefit of women. There were about 50 in Great Britain. There are a few settlements on the European Continent and in the colonies. The largest settlements are University Settlement in New York with 10,000 attending; Hull House with 6,000; and Kingsley House in Pittsburg with 6,000. In America the activity of the women in this work is very marked; in England the university men have led the way, but recently university women have done much work. In both countries it is chiefly college students or graduates who engage in settlement work.

The work centers around the persons of the few who reside in the settlement. There always are many nonresident helpers. The residents usually pay all their own expenses, except in the case of one or two officers. The residents visit their neighbors, and help with comfort and advice, but do not give money, as a rule. In the evening men and women gather in the reading and smoking parlors, and amuse themselves in various ways. Debating and dramatic clubs are popular. Of importance are the organizations conducted by the members. So far as possible in the best settlements the management is given over to such organizations, who have to settle many problems in their business meetings. Gymnastics and athletic clubs are popular, and sometimes dancing associations among the women. There are many lecture-courses and musical entertainments. Evening classes in which courses of study may be steadily pursued are also offered. Special features distinguish some settlements.

For example, dispensaries, employment bureaus and legal aid societies. Special investigations have been conducted, particularly in connection with Hull House; for example, as to the cause of an epidemic disease; and the results have proved of much value. In this work the association with university courses in sociology is often of service. The settlements have assisted the juvenile courts now being established throughout the country. In all things the atmosphere of brotherhood and democracy is to displace the spirit of envy, contempt and condescension and fear which class-distinctions tend to cause. See Emil Muensterberg, in *Charities and Commons*, Sept. 14, 1907.

Soci′ety Islands, a group in Oceania or the eastern Pacific Ocean, lying to the south of the Hawaiian group, divided into several groups, the Tahiti Islands and Society Islands proper being the chief, with the Marquesas Islands, the Leeward Islands, the Tuamotu and other groups. The Tahiti and adjoining groups belong to the French and consist of a number of islands. They are of volcanic origin and mountainous, the loftiest point on Tahiti being 7,339 feet high. These islands are governed by a French administrative council Their area is 1,520 square miles and their population about 29,000, mostly Polynesians — all forming a homogeneous colony. They have a healthful and mild climate and fertile soil, producing the guava, breadfruit, oranges, lemons and other tropical fruits. The chief industries are the preparation of copra, sugar and rum, which, with vanilla and mother-of-pearl, form [the chief exports. Pigs, dogs and rats were the only animals found on the islands when discovered, but all domestic animals have since been introduced The Spanish and English both claim the discovery of the islands, Captain Cook in 1760 giving them their name. Through the labors of English missionaries the islands, then under Queen Pomare, were Christianized in 1815. The efforts of French Roman Catholic priests to enter the country brought on a dispute with England and the final establishment of the French authority on Tahiti. Steamers connect the islands with San Francisco and New Zealand. Consult Hort's *Tahiti* and Gaffarel's *Les Colonies Francaises*.

So′ciol′ogy. The first writer to attempt a special differentiation of this science was the French philosopher, Comte (1789–1857). He conceived that the phenomena of social intercourse are subject to natural laws as definite and unvarying as those of physics or physiology. The study of these laws, or sociology, he regarded as the goal of scientific research. All sciences exist to prepare the way for the sociologist. Biology, the science of life, is the study upon which sociology, in his view, is most immediately dependent. Comte (*q. v.*) hoped from this new science to discover the principles that should be employed in regenerating society. Theoretical study thus led to immediate practice in a utopian scheme of social life. Herbert Spencer (1820–1903), the English philosopher, did much toward making sociology a science. With him the biological conception is dominant, and his two leading principles are that of evolution (*q. v.*) and the notion that society is an organism, the evolution of which involves the progressive differentiation of organs and functions and their integration into a harmonious system. Bastian, the German ethnologist, endeavored to found sociology upon psychology. He studied the effect of external conditions upon the mind, and from these effects deduced the explanation of the social relations devised by the intelligence of man.

In recent times sociology has developed into a recognized science with regular departments in many universities. It may be divided into pure and applied sociology. Pure sociology considers the general laws governing the genesis and evolution of society and the effect of social intercourse upon the character of the individual. It is especially dependent upon history, anthropology and statistics for its facts and upon psychology for its explanations. From history, political science and economics it gets an account of the institutional and industrial relations that prevail and have prevailed since civilization became well-established. From anthropology it gets an account of the social traits of primitive men and of the beginning of morality, law, religion, the arts and institutions, the family, the state and social orders. From psychology it gets the laws of social suggestion, imitation and the effects of these on different temperaments. The most important authorities on imitation are Tarde, the French writer, and J. M. Baldwin, the American psychologist. Tarde regards all social intercourse as based primarily upon imitation. Inasmuch, however, as each individual may strive to imitate many models, the result will be a composite in which some models are suppressed and others fused into a new product. Meanwhile the uses of practical life will continually act as a force determining which models shall be preserved and which shall disappear. The social mind is a product of certain inherent powers stirred into life and molded by the influence of imitation. Baldwin especially shows how the intellectual and moral life of the individual is awakened and given content by this activity. Le Bon, a French writer, sets forth the peculiar laws that govern the action of the individual when in a crowd and the effect of social characteristics upon the operation of such social forces as imitation and suggestion. Prominent present-day sociologists, while attaching great importance to imitation, do not by any means make it account for all social phenomena.

Applied sociology does not to-day concern itself so much with an attempt at an utopian reconstruction of society as with the best policy in dealing with those in whose affairs society, either for its own good or for philanthropic reasons, feels called upon to interfere. Both criminology and philanthropy are becoming important specialized sciences, and a distinct School of Philanthropy now exists in New York City. Consult Giddings's *Elements of Sociology* and Henderson's *Dependents, Defectives and Delinquents.*

Socrates (*sŏk'rȧ-tēz*), a Greek philosopher, was probably born in 469 B. C., near Athens. His father was a sculptor, and he is said to have been trained in the same art, and a statue of the Graces at the entrance to the Acropolis was thought to be his work. He served in the army in three campaigns, where his bravery and endurance were praised by his friends. In 406 B C. he was a member of the senate of 500, and refused, at risk to himself, to put an illegal question to vote. He was short and odd-looking, with a flat nose, thick lips and prominent eyes. He practiced plain living and trained himself to be indifferent to heat and cold, going barefoot and wearing the same clothing the year round. Xantippe, his wife, has been pictured as a scold, and he professed that he married her as a means of discipline. But a reformer is not always the most pleasant companion and the habits of Socrates must have been at least somewhat trying to an orderly woman.

In middle life he devoted himself to the career that has made his name forever famous. He established no school and did not call himself a teacher, but frequented the public walks, the gymnasia for bodily training, the schools and the market places, talking with any one that addressed him, in the hearing of the bystanders He had, strictly, no disciples, though some persons made a habit of being present at his conversations. As Socrates left no writings, it is from Xenophon and Plato, two of these friends and listeners, that we have the accounts of his teachings, though in Plato's writings it is difficult to tell what part of the reported conversations are the words of Socrates and what part Plato himself put into his mouth. Socrates believed that he had a special religious mission, having learned from the Delphic oracle that there was no wiser man than himself and interpreting it to mean that the highest wisdom was to be conscious of ignorance and that it was his duty, by questioning all men, to make them wise by teaching them their ignorance. The subjects of his conversations were human nature. human duties, human relations and human happiness, as being the most practical and necessary to man. Cicero said: "Socrates called down philosophy from the heavens to earth and introduced it into the cities and houses of men." In 399 B C. an indictment was laid against Socrates "for not worshiping the gods whom the city worships and for introducing new divinities of his own; next, for corrupting the youth." Plato's *Apology* gives the substance of his defense, a vindication of his whole life, but not given in a way to conciliate the jury of over 500 Athenian citizens. The vote of condemnation was carried by a small majority, though the sentence of death by poisoning was passed by 80 more votes, provoked probably by his apparent indifference to their judgment. The execution of the sentence was delayed 30 days. Socrates, refusing to escape as his friends urged him to do, spent his last day in discoursing on the immortality of the soul. In the evening he drank the hemlock, and, still talking to his friends, calmly watched the poison doing its appointed work. "Such was the end," says Phædo. "of our friend, whom I may truly call the wisest, justest and best of all the men I have ever known." Consult Zeller's *History of Greek Philosophy.* See PHILOSOPHY, PLATO and XENOPHON.

So'da is a compound of sodium and oxygen, the oxide of sodium, sometimes called a mineral alkali. With acids it forms what are known as soda-salts. The soda of commerce is one of these salts, a compound of soda and carbonic acid, and is called sodium-carbonate, carbonate of soda or sal-soda. It is in large crystals, which dissolve in water and turn to powder in the air. It is sometimes found as a white powder on the top of the ground on the alkali-plains of the west and also in the nitrate lakes of Hungary and Austria and in springs in Iceland and North America. It is manufactured largely from sea-salt, and has been obtained from the ashes of sea-plants. It is used in washing and in making Soap. The soda used in cooking is usually the bicarbonate of soda. It is prepared by adding carbonic-acid gas to the carbonate of soda in different ways, sometimes making a solution of the soda and saturating it with the gas; or by sending a current of the gas over the crystals of soda; or by a chemical process which takes place when common salt, carbon-dioxide and ammonia are brought together. Caustic soda is made by mixing milk of lime, which is slaked lime stirred up with water, with a solution of carbonate of soda, filtering and evaporating the liquid to dryness. This is used in soap-making and in many chemical industries. There are many other sodium or soda salts, as the sulphate, called Glauber's salts, the phosphate, the nitrate and soldium-chloride or common salt (*q. v.*).

Sodium (*sō' dĭ-ŭm*) is a metal very much like potassium, of a bluish-white color, and burning with a yellow flame. The compounds of sodium are the only form in which it is found in nature, as borax soda-felspar and, especially, chloride of sodium, which is common salt.

Sod'om and Gomor'rah, two cities mentioned in the Bible and thought to be on the southern shore of the Dead Sea. The Scripture account represents them as being destroyed by a shower of fire for the great wickedness of these cities, and the popular belief has assumed that the waters of the Dead Sea cover their sites.

Sofia (*sô' fē-yȧ*), the capital of Bulgaria since 1878, stands in a valley of the Balkans. It has been improved since 1891, the old Turkish city with its tumbledown houses and crooked streets being replaced by new French houses, wide boulevards, fine public buildings and electric lights. Railroads connect it with Vienna, Constantinople and Belgrade. It is the seat of the National University, which supports three faculties of 49 professors and lecturers and has about 800 students. The city also has a free library. Its trade is mainly in corn, hides and wheat. Its hot mineral springs have been celebrated for centuries. Sofia was known as *Serdica* by the Romans, and was the seat of a famous council in 343. It belonged to the Bulgarians from the 9th century until 1382, when it was captured by the Turks. In 1878 it was occupied by Russia. Population 102,769.

Soils, the different forms of earth on the surface of the rocks, formed by the breaking down or weathering of rocks. The soils will vary with the minerals in the rocks, the principle ones being quartz, felspar, clays, mica and limestone. When the soil is made from the rocks in their original position, they are called sedimentary; but if formed from rocks above them and carried to them, they are known as transported soils. When the soil is carried by glaciers, it forms drift soils; when carried by running water, it is known as alluvial soil. They are also known as clays, loams, etc. Plants also make soil by their decay. So do animals, especially earthworms (*q. v.*). A mixed soil or loam is usually better than a clay or a sandy soil. The plants grown in the soil take from it from 200 to 600 pounds per acre yearly of the minerals found in it, and the passage of water through it also carries away other quantities, so that, where crops are removed, the soil would gradually lose its power of supporting plant life, were it not enriched. This is done naturally by the gradual decomposition of the minerals composing the soil, and also by the artificial process of applying manures and other fertilizers. Another mode of overcoming the difficulty to some extent is by changing the crops grown, as different kinds of crops take up the ingredients of the soil in different proportions. Agricultural scientists are constantly studying soils. See AGRICULTURE, FERTILIZERS, MANURE and NITROGEN-GATHERING CROPS. Consult the Department of Agriculture Experiment-Station's *Bulletin 106*; the Soil-Bureau's *Publications;* the Weather Bureau's *Bulletins 3, 4* and *5*; Fream: *Soils;* King. *The Soil;* Roberts: *Fertility of Land;* and Shaler: *Origin of Soils* (in U. S. Geological Survey's *12th Annual Report*, 1890-1, Vol. One, pp. 213-45).

Sokoto (*sō'kō-tō*) is a Sudanese province of Northern Nigeria in Central Africa. It lies between Bornu on the east, Gandu on the west, Benue River on the south and the Sahara on the north, and has an area of 200,000 square miles and a population of possibly 12,000,000. The Fulahs are the ruling race, the Hausas and other Negro tribes the subject population. The sultan in 1885 put his kingdom under British protection, granted the Niger Company a monopoly of trade, and afterward received a resident. The country is fertile and well-watered, and has extensive deposits of excellent iron. The people are intelligent, industrious and peaceful, good farmers, great traders and manufacturers of ironwork, muslin and shoes. Sokoto the capital is a city of 80,000, and is well-built in the Moorish style.

So'lar Mi'croscope, a modified form of magic-lantern, not much used now that gas-lanterns and electric lanterns have become so easily available. The only essential difference between the solar microscope and the ordinary magic-lantern is that in the former a beam of sunlight, reflected from a heliostat or porti-lumiere, is employed instead of oil, gas or the electric arc for illuminating the slide.

Solar Sys'tem a term used in astronomy to include the sun, planets, satellites of planets, asteroids and any "captured" bodies, as possibly periodic comets. See ASTEROID, ASTRONOMY, MOON, PLANET and SUN.

Sol'emn League and Covenant, The, was a contract entered into by the General Assembly of the Church of Scotland and the Commissioners from the English Parliament in 1643 to secure uniformity of doctrine, worship and discipline throughout Scotland, England and Ireland "according to the word of God and the example of the best reformed churches." By this agreement the Scotch army came to the aid of Parliament in its war against Charles I. On the other hand, Presbyterianism was introduced into England and Ireland. Royalist successes had made Scotch aid indispensable. So the covenant was signed by members of the House of Commons and

Assembly divines who took oath "to labor for the preservation of reformed religion in the church of Scotland and the reformation of religion in the kingdoms of England and Ireland." It formed a bond of union between England and Scotland during the war, but was abjured in both countries by act of Parliament in 1662.

Soldier's Homes in the U. S. These comprise the National Soldier's Home in Washington, D. C., for the maintenance of discharged soldiers and pensioners of the regular army, where they are lodged, fed and clothed without personal cost, and also if sick, medical attendance. The inmates who to-day number about 1,250, are subject, as army soldiers, to the rules and articles of war. Another institution, similarly conducted and with like object, is the National Home for Disabled Volunteer Soldiers (including sailors), with headquarters at New York City and branches at ten other cities and towns, whose aggregate members cared for number about 30,000. Besides these there are state homes for the same class in about 30 states of the Union, the state and town location of each institution being found in current issues of *The World Almanac* and other year-books.

Solferino (*sŏl'fer-ē'nō*), a village of northern Italy, 19 miles from Mantua. It stands on a hill with a high tower, called The Spy of Italy, from which can be seen the whole plain of Lombardy. It is noted as the scene of the defeat of the Austrian forces by the French and Sardinians, June 24, 1859. The battle lasted 16 hours, the Sardinians being commanded by Victor Emmanuel, the French by Napoleon III and the Austrian forces by Emperor Francis Joseph. The Austrian loss was 20,000, and that of the allied troops 18,000. On June 24, 1870, the bones of the dead were collected in the presence of representatives of France, Italy and Austria, and buried in three great sepulchers. Population 1,350.

Sol'omon, the third king of Israel, the son and successor of David. He reigned 40 years, 993–953 B. C., and was famous for wisdom as well as for his splendid court. His father left a large army and a full treasury, which he used in keeping peace with the neighboring nations and in building fine palaces and the temple, the chief glory of his reign. He extended trade, sending out fleets and caravans which brought back gold, gems and precious woods from Ophir and horses for his chariots from Egypt. His great wealth, however, came from heavy taxation, and he built altars for the idols worshiped by his heathen wives, which caused the nation after his death to revolt against his son and ended in the division of the kingdom. The writings that bear his name are the *Proverbs*, *Ecclesiastes* and the *Song of Songs*, though *Ecclesiastes* probably belongs to a much later period.

Solomon's Seal, a species of plants of the lily-family and related to the asparagus. The plant grows from one to four feet high, with broad green leaves, without stems, and drooping, greenish flowers, followed by small black or blue berries. It is found wild in many parts of North America and in Europe.

So'lon, the ancient Greek lawgiver and one of The Seven Wise Men, was born about 638 B. C. Though tracing his descent from the royal family of Attica, he had to resort to trade to restore the wealth his father had squandered. He was known as a writer of verses, one of his finest elegies having been quoted by Demosthenes and several quotations being found in a work of Aristotle's. The beginning of his political career was the Megarian War. The Athenians had several times failed in their efforts to capture Salamis, and had, on pain of death, forbidden any citizen to renew the attempt. Solon, by feigning madness, aroused the people by his poem, and war was declared, with Solon in command, who succeeded in winning Salamis for Athens. He was made archon or chief ruler in 504, when the country was in danger of a conflict between the nobility and the peasants. The constitution of Athens, such as had never existed before, was the great work of Solon, and made property and not birth the title to citizenship, the aim being to give the lower classes some control of the law. The laws of Draco were repealed except those against murder; no man could be imprisoned for debt; a limit was placed on the ownership of land; and laws against luxury in food and dress were made. These laws, written on pieces of wood, were preserved in the Acropolis and the people bound themselves by oath to observe them for ten years. Solon traveled then in Cyprus, Asia Minor and Egypt, meeting Crœsus, king of Lydia, whom he offended by his answer to his question "Who was the happiest man in the world?" Solon replied that it was Tellos, an Athenian who had died for his country. Crœsus asked the question again, thinking to hear his own name in answer as the possessor of great wealth, but Solon gave the place to two Argive youths whom the gods permitted to die in their sleep as a reward for an act of kindness. (See Crœsus). His last years were passed at Athens, where he unsuccessfully opposed the usurpation of Pisistratus, his kinsman. He died about 558 B. C., leaving a command that his ashes be scattered over the "lovely isle" of Salamis. Consult *Histories of Greece* by Grote, Curtius and Cox.

Sol'way Firth is an inlet of the Irish Sea, lying between England and Scotland. It is 36 miles long and receives the waters of the Derwent and Eden on the English side and of the Esk, Dee and Annan on the Scottish side. Near Annan the Firth is crossed by a railway bridge 5,880 feet long, which, built in 1866–69, was almost destroyed by floating ice in 1881. The scenery of the region is painted by Scott in *Redgauntlet* and *Guy Mannering*.

Solyman (*sŏl'ĭ-man*) or **Suleiman** (*sōō'lā-män'*) **I**, called The Magnificent, was the greatest of the Turkish sultans. He was born in 1490, and succeeded Selim I, his father. He made many reforms in the internal government of his empire and was known as a patron of learning and of arts. Abroad, he began by extorting in 1521 the tribute refused by the king of Hungary and by overcoming the Knights of St. John at Rhodes, after a siege of six months and the loss of nearly 100,000 men. At the battle of Mohács, in August, 1526, he destroyed the Hungarian army, killing King Louis, and, marching on, captured Buda and Pesth. In 1529 he drove Ferdinand of Austria out of Buda, losing 40,000 soldiers in a vain attack on Vienna. He conquered large portions of Armenia and Persia and the whole of northern Africa except Morocco. A truce, made in 1562, finally left Hungary and Transylvania to Solyman. He died in 1565, while besieging a small fortress in Hungary.

Somaliland (*sō-mä'lē-lănd*) is a peninsula on the eastern coast of Africa that extends from the Strait of Bab-el-Mandeb to the Equator. It borders the Gulf of Aden and the Indian Ocean, has an area of 197,000 square miles with a population of 800,000, and is divided into Abyssinian territory and British, French and Italian protectorates. Abyssinia and England each possess considerable portions, but Italy controls far the largest area, while France has but a small section. Game abounds, and some parts of the country produce cacti, grasses and palms, but the territory is arid and generally barren. The inhabitants are Mohammedans and of difficult disposition. They live by their herds of camels, cattle, goats and horses and by a trade in coffee, frankincense, myrrh, ostrich-feathers and salt.

British Somaliland lies along the Gulf of Aden between French Somaliland and Italian Somaliland. When Egyptian control ceased in 1884, it became a British possession. Its area is 68,000 square miles; population 300,000 Muslim nomads, except on the coast where considerable towns have arisen since 1884; and chief city Berbera with 30,000 inhabitants in the trading-season. The annual fair deals in cotton-goods, dates and rice. The exports include cattle, gum, hides, ostrich-feathers, sheep and skins Transport is by camels, there being no porters. The protectorate is governed by a commissioner of the British colonial office.

French Somaliland, which now includes the older colony of Obok, extends from Eritrea to British Somaliland. Abyssinia lies behind it, the Gulf of Aden in front. Its area is 12,000 square miles, its population 50,000. The coast is arid, but the interior contains fertile areas. The capital is Jibutil, with 11,000 inhabitants, 500 being Europeans. France is developing the region rapidly, Jibutil having become an important shipping-station. A railway connects it with Diré Dawah, the station for Harar in Abyssinia. The country has scarcely any industries, but coastal fisheries and inland trade make considerable commerce. The chief exports are ivory, wax, coffee and living animals; the principal imports food, drink, tobacco, cottons, silks and Mocha coffee. Affairs are administered by a governor and council.

Italian Somaliland extends from British Somaliland down to British East Africa. Stretching 1,000 miles from north to south and extending 200 miles inland to Abyssinia, it covers 100,000 square miles and claims 400,000 inhabitants. Lying along the Gulf of Aden and the Indian Ocean, it occupies the extreme east or "horn" of Africa and ends in Cape Guardafui. It is but slightly known, but the bulk of the land seems arid though there are several fertile river-valleys. Arabs inhabit the coast, Somals, Gallas and other races the interior. The chief towns on the coast are Mogadishu and Obbia. The protectorate by Italy dates from 1889, and has been extended from time to time. The country is administered by the Italian government, which in 1905 gave some territory off the Aden coast to "the mad mullah," a Muslim fanatic who had for years troubled British Somaliland.

Som'erset, Lady Henry (Isabel), a daughter of the Earl of Somers, is a social and temperance reformer. Born in 1851, she married in 1873. She is the founder of a rural colony for female inebriates at Duxhurst, Surrey. She is well-known as a lecturer in the United States; has written for periodicals; is the editor of *The Women's Signal;* and has been president of the National British Women's Temperance Association. She is the author of *Studies in Black and White, A Book for Children* and *Our Village-Life.*

Som'erville, Mary (Fairfax), a Scotch scientist, was born at Jedburgh, Dec. 26, 1780. An algebraic sum in a magazine of fashions first interested her in the study of mathematics, in which she afterwards became famous. Her first husband, Captain Greig, was Russian consul in London, where she lived for two years until his death. The six years before her marriage with Dr. William Somerville she spent in study at Edinburgh. Going back to London in 1812, she attracted attention by experiments on the violet rays of the solar spectrum, the results being published in the *Philosophical Transactions* of 1826. Lord Brougham asked her to put Laplace's *Celestial Mechanics* into popular form, which she did, publishing her book under the title of *Mechanism of the Heavens* in 1830. (See LAPLACE.) She was granted a pension in 1835 and made a member of the Royal Astronomical Society of England and of many foreign societies. She was in favor of "woman's rights" and woman suffrage. When 91 she spent five hours a day in mathematical studies. Other works published by her are *Connection of the Physical Sciences*, *Physical Geography* and *Molecular and Microscopic Science.* She died at Naples, Nov. 29, 1872, having lived in Italy for many years. Consult *Life* by her daughter.

Som'erville, Mass., is a suburb of Boston about two miles from the state-house. It manufactures flour, leather, iron and bricks, and has slaughter-houses, bleaching-works, iron-foundries and many fine residences. Population, 110,000.

Son'net, The. We owe the sonnet, in its structure and design, to Italy. Since Shakespeare and the early English sonneteers, Sir Thomas Wyatt, the earl of Surrey and Edmund Spenser, to Wordsworth, Cowper, Byron, Keats, Shelley and the modern English and American bards, the sonnet has always had a peculiar fascination for poets of the first class. The Italian sonnet was written in its perfection by Dante, Petrarch and Tasso; and, though the form of the Petrarchan sonnet has been closely followed by English poets, the Shakespearean form has been its keen rival — both dominating other rime* arrangements of this artistic, poetic form of 14 rimed or partially rimed verse. "The Italian sonnet consisted of 14 lines, divided into two groups of eight and six lines respectively; the first eight (called the *octave*) having only two rimes between them — the first, fourth, fifth and eighth lines being in one rime, and the second, third, sixth and seventh being in the other. There then was a pause in the sense, and the six concluding lines (called the *sestette*) had two rimes between them, those rimes generally alternating in the most finished specimens. In this form of sonnet Wyatt and Surrey wrote; but since then the only fixed rule in regard to the English sonnet has been that it should consist of 14 lines. The great English masters of this form of verse have all differed in their arrangement of the rimes. Spenser divides the 14 lines thus: The first and third lines rime one way; the second, fourth, fifth and seventh another; the sixth, eighth, ninth and eleventh another; and the tenth and twelfth another, the last two lines forming a couplet with another rime. Shakespeare's sonnets consist simply of three quatrains and a couplet, the rimes being seven in number. In Milton's sonnets there is the classic division into *octave* and *sestette*, the former being properly carried out, but the latter being fitted with three rimes — the ninth and twelfth, tenth and thirteenth and eleventh and fourteenth riming together." Wordsworth admittedly is the greatest of English modern sonneteers, some of his sonnets, for exalted feeling as well as for felicity of fancy and of diction — as those dedicated to liberty and his ecclesiastical sonnets — including not only some of the finest things *he* ever wrote but some of the finest that were ever written. Here is one — in its design an apology for and commendation of the sonnet:

"Scorn not the sonnet; critic, you have frowned
Mindless of its just honors; with this key
Shakespeare unlocked his heart; the melody
Of this small lute gave ease to Petrarch's wound;
A thousand times this pipe did Tasso sound;
With it Camoens soothed an exile's grief;
The sonnet glittered a gay myrtle leaf
Amid the cypress with which Dante crowned
His visionary brow; a glowworm lamp
It cheered mild Spenser, called from Faery-land
To struggle through dark ways; and when a damp
Fell round the path of Milton, in his hand
The thing became a trumpet, whence he blew
Soul-animating strains — alas, too few!"

Sons of Lib'erty is the title taken by an organization first formed to oppose Grenville's stamp-act of 1764. It was strongest in New York and Connecticut. This association was active in promoting the separation of the American colonies from Great Britain. In Georgia the Liberty Boys drove out the royal governor; and in all the states they helped to overawe the loyalists. The Sons of Liberty incorporated about 1790 or 1800 with the Tammany Society.

Sontag (*zôn'täg*), **Henrietta,** Countess Rossi, a German singer, was born at Koblenz, Prussia, Jan. 3, 1806. She appeared on the stage when only six; studied music at Prague; and appeared there at 15. She rose to the first rank of European singers in her brilliant career at Vienna, Berlin and Paris. After her marriage with Count Rossi, an Italian nobleman, in 1828 she left the stage, but appeared again in 1849 on account of pecuniary troubles. She made a successful tour in the United States, and died at Vera Cruz, Mexico, June 18, 1854.

Sophocles (*sŏf'ô-klēz*), an Athenian poet, was born in 496 B. C. At 16 he was chosen to lead the chorus of youths who celebrated the naval victory of Salamis. At 28, in a dramatic contest, he was awarded the prize which had been given to Æschylus for many years. Only seven of his many dramas are preserved, but these place him at the head of the Greek dramatists. The probable order in which they appeared is *Ajax; Antigone; Electra; Œdipus the King;*

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* Webster gives rime, not rhyme, as etymologically preferable and as again coming into use.

Trachinian Women; Philoctetes; and *Œdipus at Coloneus. Antigone,* one of the earliest dramas, produced in 440. gained the prize and so pleased the Athenians that he was made commander with Pericles in the Samian War. There are only fragments and titles of the other plays. He is said to have been beautiful in person, a fine musician and athlete and a ready wit. His death has been attributed to losing his breath in prolonging his voice in a public reading of *Antigone;* or to excess of joy at a dramatic victory; but without sufficient authority. He died in 405 B. C. Consult *Sophocles* in Green's "Classical Writers," by Campbell and *Lectures* by Schlegel. See ÆSCHYLUS, DRAMA and EURIPIDES.

Sorbonne (*sôr-bŏn'*), the earliest and most famous of the colleges of the University of Paris in the middle ages. It was founded in 1253 by Robert of Sorbon, and was the first institution connected with the university that was intended as a place of living as well as of study, as before this the great crowd of students of the university had found lodgings wherever they could. It was devoted to the study of theology, and the life was monastic, the students calling themselves "the poor masters of the Sorbonne." It soon became celebrated as the first theological school in Europe, its decision on disputed points was accepted as decisive, and it drew its scholars from all Europe. But when the new learning found its way into France at the beginning of the 16th century, the Sorbonne, though it had led to the introduction of printing in France, opposed all reform either in study or religion and lost its position. Its property was confiscated in the Revolution in 1792, but the Sorbonne was revived under Napoleon in 1808, and was made the seat of the three departments of the University of France,—theology, science and literature. New buildings were erected in 1884, the largest theater seating 3,000.

Soredia (*sō-rē'dĭ-ȧ*) (in plants), minute granules which appear on the surface of many lichens, making them appear powdery. Soredia are scattered by the wind and form new lichens. Each one consists of a few alga-cells invested by some fungus filaments. See LICHENS.

Sorel (*sō-rĕl'*), **Can.,** county-seat of Richelieu County, Quebec, lies on the St. Lawrence at the mouth of Richelieu River, taking its name from a captain of the Carignan-Salières regiment, who built a fort on this site in 1665. It has 7,057 inhabitants, engaged in trade with the surrounding country and in its shipyards and foundries.

Sorghum (*sôr'gŭm*), a plant belonging to the grass family, whose original home is thought to have been the interior of Africa, but it has not yet been found growing wild there. It is nearly related to the sugar-cane, and has been cultivated from the most ancient times. It is extensively cultivated in this country for the production of sorghum-molasses, and a large amount of sugar is also manufactured as an incidental product. As a source of sugar, however, it does not compete with sugar-cane and the sugar-beet. See SUGAR.

Sorus (*so'rŭs*) (in plants), a definite group of sporangia, as in the ferns, in connection with which the term is chiefly used. See FILICALES.

Sothern (*sŭth'ĕrn*), **Edward Askew,** an American actor, was born at Liverpool, England, April 1, 1826. His first appearances on the stage in England and the United States were not particularly successful, until in 1858 he assumed the character of Lord Dundreary in the comedy of *Our American Cousins,* which was made so rich and entertaining by Sothern's acting that it became famous, the comedy running 140 nights in New York and nearly 500 in London, and being again and again repeated at other times. His most successful character next to Dundreary was David Garrick, both characters making his name famous. He died at London, Jan. 21, 1881. Consult Pemberton's *Memoir.*

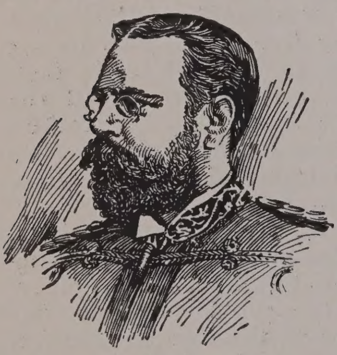
Soulanges (*so͞o'länzh'*) **Canal, Can.,** extends from Cascade Point to Coteau Landing, overcoming the Cascade Rapids, Cedar Rapids and Coteau Rapids. From the head of the Lachine to the foot of the Soulanges the distance is 16 miles. Its length is 14 miles. It has five locks, 280 by 45 feet. The total rise or lockage is 84 feet. It is 100 feet wide at the bottom and 164 at water-surface. The depth of water on the sills is 15 feet. See LACHINE.

Soult (*so͞olt*), **Nicholas Jean de Dieu,** marshal of France, was born at St. Amans-la-Bastide, March 29, 1769. He enlisted as a private and was six years in reaching the rank of sergeant, but then rose rapidly. He was from 1794 to 1799 in constant service in Germany and on the French frontier. He served in command of a division under Masséna in his Swiss and Italian campaigns. In 1802 Napoleon made him one of four consular guards, and in 1804 a marshal. He decided the battle of Austerlitz by piercing the Russian center, and was in the Prussian and the Russian campaign. He drove the British out of Spain and held Portugal until driven out in turn by Wellington. As commander in Spain he gained a victory at Ocaña in 1809, and subdued Andalusia. Failing to enlist Joseph Bonaparte in his plans, he asked to be relieved of his command, but was sent back by Napoleon, after the battle of Vittoria, as the only commander who could turn back the tide of disaster and successfully meet the strategy of Wellington with his own brilliant tactics. He became a royalist, when Napoleon had abdicated, but went back to him on his return from Elba. He was banished after

Waterloo, but in a few years was restored to his former honors. In 1838, at the crowning of Queen Victoria, he was sent as an ambassador to England and warmly welcomed by Wellington, his old opponent. His last honor was the title of Marshal General of France. He died on Nov. 26, 1851. Consult Napier's *History of the Peninsular War*.

Sound. See Acoustics.

Sound'ing is measuring the depth of the sea. It has been done from the earliest times by a rope, marked off into fathoms, with a leaden weight attached. The difficulty was that there was no certainty that the weight had reached the bottom. In 1854 a new method was tried by which the weight or sinker would be removed from the line when it struck the bottom. Wire-rope is usually used for deep-sea soundings. Magellan tried to find the depth of the Pacific in his first voyage around the world, and, when he could not find the bottom at 200 fathoms, concluded that he had crossed the deepest part of the ocean. In 1818 Sir John Ross found the depth of the Arctic seas to be 1,050 fathoms; in the Antarctic Ocean he reached 2,425 fathoms, and twice, with 4,000 fathoms of line, no bottom was reached. Consult Sigsbee's *Deep-Sea Sounding and Dredging*.



JOHN PHILIP SOUSA

Sousa (*soo'za*), **John Philip,** American orchestra-conductor and band-leader, was born at Washington, D. C., in 1854, and early manifested musical talent and proclivities toward the orchestra in theaters as well as familiarity with the life of a circus musician. Even at 17 he was a band conductor and one of the first violin players in an opera troupe. From 1880 to 1892 he was band-leader of the United States Marine Corps, and since director of his own well-known band. He has composed many orchestral pieces, marches, songs, waltzes etc., with light operas, as *El Capitan, The Bride Elect* (libretto and music) and *The Charletan*. Among his other compositions, many of which have become very popular, are *Sheridan's Ride, The Liberty-Bell, The High-School Cadets*.

South Africa, Union of, a self-governing dominion of the British Empire, comprising the provinces of Cape of Good Hope (formerly Cape Colony), Natal, Orange Free State and Transvaal. The Union has an area of 475,000 square miles, and a population of about 6,000,000, a quarter of whom are white. Pretoria is the capital, but the legislature meets at Cape Town. The Union was formed in 1909. In 1919 German Southwest Africa was added to it as a mandatory of the League of Nations.

South Af'rican Republic. See Transvaal.

South Amer'ica. See America.

South Austra'lia. See Australia.

Southampton (*sŭth-hămp'tŭn*), an important seaport in England, 79 miles southwest of London. There are remains of the town-walls built in the 14th century, and four of the seven gates. The oldest church, St. Michael's, shows the Norman architecture, and God's House, dating from the 12th century, is one of the earliest hospitals in England. There are large docks, a new one covering 18 acres being built in 1890. There is a large cattle-trade with Spain and Portugal, and shipbuilding is extensively carried on. Southampton, called in the Saxon *Chronicle* Suth Hamtune, was founded by the Anglo-Saxons. It was burned by the French, Spanish, and Genoese fleets in 1338. The White Star steamships to the United States sail from Southampton. Population 119,745. Consult Davies' *History of Southampton*.

South Bend, Ind., county-seat of Saint Joseph County, on the St Joseph River, 86 miles southeast of Chicago The Roman Catholic University of Notre Dame (*q. v.*), the largest Catholic school in the west, is a short distance north; there are fine buildings, a library and a Gothic church with the famous Chimes of Notre Dame, 13 full collegiate courses of study and 1,000 students. There are ten wagon and carriage works, the most extensive being the great Studebaker wagon and carriage works covering nearly 100 acres. The Oliver plow-works occupy 43 acres, and there are manufactories of agricultural implements, besides automobiles, steel-ranges, sheet-iron products, watches, knit-underwear, furniture, paper, woolens and flour. All told, the city contains over 300 factories. South Bend has 32 churches, admirable public and parochial schools, commercial schools, a teacher's training-school, a conservatory of music and a public library. Population 90,000.

South Beth'lehem, Pa., on Lehigh River, opposite Bethlehem, is the principal Moravian town in America, founded in 1745. South Bethlehem has factories of steel, zinc, boilers and shovels. It is the site of Lehigh University, founded in 1865 by Judge Packer, who gave 115 acres of land and $2,500,000. The fine buildings stand on a terrace on South Mountain, and include a fine gymnasium, observatory, several fine laboratories and a beautiful Gothic library-building. Population 19,973.

South'bridge, Mass., a town in Worcester County on Quinnebaug River, 21 miles from Worcester. The settlement was made about 1730, and incorporated in 1816. Its chief manufacturing establishments include woolen and cotton mills, shuttle-works, optical instruments, printing and knife works. The town has good public and parochial schools, a high school, a fine library, several churches and a Y. M. C. A. building. Southbridge is served by a branch of the New York, New Haven and Hartford railroad. The population in 1930 was 14,264.

South Carolina (*kăr-ō-lī'nȧ*), is one of the original states of the American Union of the South Atlantic group, and popularly known as the "Palmetto State" because of the common growth of the Palmetto tree within its boundaries. The State is shaped like a triangle bounded by North Carolina on the north and northeast; the Atlantic Ocean on the southeast, and Georgia to the southwest and west. South Carolina extends over an area of 30,989 square miles, 494 square miles of which are water.

Surface. The State consists of two distinct belts, the coastal plain and the Piedmont plateau, and is naturally divided into sections running parallel with the coast known locally as low country and up country. Three-fifths of the State is located within the coastal plain. This section is divided according to form, soil and vegetation into the coastal belt, the lower pine belt, the upper pine belt and the hill belt. Large salt marshes line the coast extending for some distance inland inundating the shore with countless inlets and flat broad islands. Above the sand hills rises the Piedmont plateau which is quite abrupt and is marked by many water falls. This elevation varies from 350 feet to 1,000 and 1,200 feet in the west, the surface becoming hilly and broken at the approach of the Appalachian Mountains. The Blue Ridge Mountains, a ridge of the Appalachian range, extend down in the northwestern corner of the State. Table Mountain is the highest point in the State with an altitude of 4,000 feet. The main river systems are the Pedee, the Santee and the Savannah. These waters rise in the Appalachian region of North Carolina and are navigable to the fall line. Between the Santee and the Savannah system are the minor river systems, which include the Ashley, Cooper, Edisto and Combance Rivers. The Ashley and Cooper, which are arms of the sea rather than rivers, unite in forming Charleston Harbor. The rivers all flow from the northwest in a southeasterly course to the ocean, furnishing an abundance of water power in the Piedmont region and at the fall line. Across the coastal plain they flow slowly with the tide coming up the rivers to an average length of twenty miles, and overflow into the rice fields.

Climate. The influence of the sea tempers the climate of South Carolina, making it very healthful, except in the swampy portions near the coast, which are malarial. The summer's heat is tempered by the influence of the mountains in the northwest and by the sea breezes in the southeast. The mean annual temperature is sixty-three degrees Fahrenheit for the State and sixty-six degrees at Charleston. The average annual rainfall is forty-nine inches. The mountains in the higher part of the State are pleasant summer resorts, while the dry, bracing atmosphere and the long leaf pine forests of the sand hills make that section an ideal winter home for invalids and pleasure seekers.

Minerals. The minerals in South Carolina, none of which are very extensive, are of many varieties. There are two gold mines in the State, the output from which is decreasing rapidly. In 1920 there were fourteen fine ounces mined, valued at $300, while in 1911 there were 972 fine ounces valued at $20,100. Rich deposits of kaolin and fine brick-clay extend entirely across the State. Granite quarries are numerous, but the most valuable mineral resources are the beds of phosphate rock found near Charleston and Beaufort. These deposits underlie the surface from six inches down to twelve feet and are entirely phosphate rock. There are also deposits of iron, fuller's earth, manganese, monazite, asbestos, mica, nickel, copper, silver, barytes and marl, all usually found in small quantities.

Production and Industry. Large plantations formed the farm unit in South Carolina up to 1850, which have disappeared in name only since the Civil War. The land is still parcelled out to tenants and is under the management of the plantation owner. Negroes form the majority of farmers numbering more than fifty per cent in 1930. There were 157,931 farms extending over an area of 10,393,113 acres in the same year, 5,037,000 acres of which were under cultivation.

The field and forest products are more varied, perhaps, than those of any other State in the Union. The products range from oranges, lemons and grape-fruit to rye, barley and wheat; the forest trees from the palmettos, cypress and magnolias to the ash, white pine and hemlocks. The State has the only successful tea gardens in America. Cotton is the leading crop of South Carolina, totalling more than one-half of all the crops. The Sea Island cotton grown to a large extent is of the finest grade produced in the country. In 1932, there were 1,842,000 acres devoted to the growing of cotton from which the yield was 695,000 bales. The lint from this crop was valued at $19,755,000 and the cotton seed produced, was valued at $2,988,000. The cotton plantations stretch over the northwest and western sections of the State. Tobacco, peanuts, corn, oats, winter wheat are raised in large quantities. There were 39,236,000 pounds of tobacco harvested from 68,000 acres in 1932, and 14,720,000 pounds of peanuts produced from 23,000 acres. The production of cereal crops in 1932, 17,885,000 bushels of corn; 7,974,000 bushels of oats, and 760,000 bushels of winter wheat. Other important agricultural products include sweet potatoes, potatoes, rice, hay, sugar cane, sorghum syrup, peaches, pears, apples and seeds other than cereals, flowers, plants and nursery products. The State derives an income of $62,496,000 from the crops and $28,667,000 from the livestock. Some dairy farming is engaged in and seems to be increasing in recent years. In 1932 there were 170,000 milch cows on the farms, with 96,000 other cattle; 26,000 horses; 14,000 sheep, and 582,000 hogs.

More than sixty per cent of the area of the State is woodland with 43,490 acres included in national forests. Yellow pine and cypress have been cut abundantly, so that today only 14,000,000 M board feet remain standing of the pine. The lumber industry has been carried on so extensively that the forest area has been reduced to 1,000,000 acres.

The fisheries of the State are especially valuable, with oysters representing more than half of the entire catch. Other important fish caught include whiting, shad, sea bass, clams, terrapin, mullet, jewfish and shrimp.

The manufacture of cotton goods is the leading industry of South Carolina. The active spindles used in cotton weaving numbered 5,516,892 on July 31, 1932, consuming 1,017,531 bales of cotton. The manufacture of hosiery, knit goods, cotton goods, including plain cloth for printing or converting, brown or bleached sheetings and shirtings, twills and sateens, cottonseed oil and cake, contribute largely to this leading industry of South Carolina. The manufacture of planing mill products, including sash doors and blinds, packing boxes, logs and rough lumber combine to make lumbering the second important industry of the State. The manufacture of fertilizers from the rich beds of phosphates is of national note and the manufacture of turpentine and resin which was the oldest industry of the State, is now rapidly declining and of secondary importance. To a great extent South Carolina carries on her industries from the natural resources found within the boundary of the State. The leading manufacturing cities are Charleston, Columbia, Greenville, Spartanburg, Florence and Sumter.

Transportation. Excellent transportation facilities exist in South Carolina with all the main trunk lines of the South operating in and out of the State, these in turn served by feeder lines. The most important roads are the Seaboard Air Lines; the Southern and Carolina; the Atlantic Coast Line; the Charleston and Atlantic and Western railways. There are 3,774 miles of steam railroads and 286 miles of electric roads in the State.

South Carolina has three large harbors located along the seacoast at Georgetown, Charleston and Beaufort which carry on a large part of the export and import trade of the country. Extensive harbor improvements have been made recently at Charleston, making this the leading port of the Southern Atlantic sea coast. Most of the rivers are navigable up to the fall line to an extent of ninety to 125 miles which adds to the efficiency of the transportation system in the State. There are 5,957 miles of highways maintained by the State, 4,452 miles of which are hard surfaced.

Population. In 1930 the population of South Carolina was 1,738,765. During the decade between 1920 and 1930 the population showed an increase of three per cent or 55,041 inhabitants. There are 793,681 Negroes in the State. There are few foreign born whites in South Carolina, numbering less than one per cent of the total population. Germany, Greece, Russia, and England are the principal countries represented among the State's inhabitants. Less than a fourth of the population of South Carolina dwell in the cities and towns.

The most important cities of the State, with their populations in 1930, are: Charleston, 62,265; Columbia, the capital, 51,581; Greenville, 29,154, and Spartanburg, 28,723.

Education. Since 1922 school attendance has been compulsory over the State. Sixty per cent of children between five and twenty years of age were enrolled in the schools in 1930. The State has a well organized system of education with a State superintendent elected for a term of two years at its head. He is assisted by a Board, including the Governor, superintendent of instruction and seven members appointed for four-year terms by the Governor. Each of the forty-six counties maintains a board of education, including the County Superintendent elected for a term of two years, and two members appointed by the State Board of Education to serve for four years. Separate schools for white and negro children are maintained. In the 4,093 elementary schools, including those for both races, there were 469,370 pupils enrolled with 13,480 teachers in 1930. There were 302 high schools with an enrollment of 40,020 pupils and 2,024 teachers in that year. The State expended $16,187,319 on its educational system in 1930.

The University of South Carolina was chartered in 1801 and opened in 1805 under the name The College of South Carolina. During the Civil War the college was utilized for a hospital for Confederate troops and then later for Union soldiers. It was organized under the name University of South Carolina in 1887, and to-day includes colleges of arts and sciences, law, engineering, commerce and finance, education and a graduate school. Other institutions of higher learning include the Clemson Agricultural and Mechanical College of Clemson; The Citadel; the Military College of South Carolina at Charleston; Wofford College at Spartanburg; Furman University at Greenville; Erskine College at Due West, and Columbia College at Columbia. The University of South Carolina is the largest of such institutions with an enrollment of 1,714 students and 105 professors in 1933.

Government. The State has had six constitutions. The present Constitution was adopted in 1895. The General Assembly consists of two houses, the Senate with forty-six members and the House of Representatives with 124 members. The Senators are elected for four-year terms, half of the group retiring biennially, and the Representatives serving for two-year terms. The franchise is granted to those who have registered and paid the poll tax. These restrictions keep the white voters in majority.

The executive department of the State comprises the Governor, the Lieutenant-Governor, Secretary of State, Treasurer, Attorney-General, Comptroller-General, Adjutant-General, and Superintendent of Education. All officers of the State are elected for a term of two years.

The judiciary consists of a supreme court, two circuit courts and county and municipal courts. The Supreme Court consists of five justices elected by the legislature for six-year terms; the circuit courts include the Court of Common Pleas and the Court of General Sessions.

The State of South Carolina is represented in the National Congress by two Senators and six Representatives.

History. The first Europeans to touch the shores of what is now South Carolina were a group of Spaniards from Santo Domingo in 1521. France, England and Spain, either by right of conquest, purchase or discovery, claimed the territory, but the first settlement on the soil was made by French Huguenots in 1562 near Beaufort. This colony proved a failure. The first permanent settlement was made by the English in 1670 on Ashley River near Charleston. Two hundred negro slaves were brought from the Barbadoes in 1671. Since 1820 the negro population has exceeded the white. In 1685 a large number of French Huguenots settled in South Carolina and later German, Irish, Scotch and Welsh immigrants arrived. The region including South and North Carolina and Georgia was granted to eight proprietors by Charles II. The land was governed by a constitution which was known as the "Fundamental Constitution," which had been formulated by John Locke. The colonial government succeeded in developing the plantation system. From this time on disputes arose between the proprietors and the settlers until the latter revolted and the owners were overthrown, the territory reverted to royal control. The colony was ruled by a governor appointed by the king and an assembly elected by the people. Prosperity began and continued until the beginning of the Revolution. In early years the colony suffered from Indian raids, but finally were driven out. These Indians still have a small reservation on Catawba River with less than one hundred inhabitants. In 1774 the first act was passed to oppose royal control by force, and in the following year the first military force was raised for defense of the colony against the English government, and the importation of British goods was prohibited. The first important victory of the Revolutionary War was won at Fort Moultrie, June 28, 1776. At a later date, Charleston was captured and made the British headquarters in the south. Ninety-six prisoners and Camden were taken, and except for the resistance of Marion and Sumter, the colony would have been conquered. The tide turned at King's Mountain. Severe battles were fought at Cowpens and Eutaw Springs and the British were driven back until they held only Charleston. In 1788 the colony was admitted to the Union as the eighth State.

When the government under the Federal Constitution had been established, South Carolina under the direction of John C. Calhoun, soon became the leading exponent of states sovereignty. The nullification act was passed in 1833 by which South Carolina declared the United States tariff null and void and not binding upon her citizens.

Upon the close of the Civil War, South Carolina refused to adopt the Fourteenth Amendment. This event brought about the establishment of a military government which was maintained in the State for a period of twelve years. A new State Constitution was adopted in 1868 which provided for negro suffrage. The State was readmitted to the Union on June 25, of that year. South Carolina suffered greater losses during the Reconstruction Period, which followed one of misrule and demoralization, than any other State in the Union, just as it had suffered heavy losses during the years of the war. The slaves, already a majority of the population, became citizens. Rival governments existed, bitter contests were waged, and much of the time the upper strata of white folks were not permitted to participate in government affairs. This state of affairs continued until 1876, when at the gubernatorial election, General Wade Hampton was elected Governor of the State. Since that date South Carolina had enjoyed an era of prosperity.

In August, 1886, a disastrous earthquake visited the city of Charleston which proved to be one of the most destructive quakes that has ever been experienced in the United States. More than half of the city was destroyed and scores of lives were lost. Reconstruction work was immediately begun, however, and a new and more prosperous Charleston arose from the débris. In 1902 the South Carolina Interstate and West Indian Exposition was held at Charleston. The Exposition, which opened on December 1, 1901, was called the "Ivory City," to demonstrate the new and rising industries and commerce of the Southern States. The site of the Exposition extended over an area of 250 acres. There were seven principal buildings on these grounds. Up until the closing date of the exhibition, less than 500,000 people had attended the event, and on June 1, 1902, the Exposition closed, its receipts having failed to equal its cost.

South Carolina, The University of, is situated at Columbia. It was chartered in 1801 and opened in 1805. The University was closed in 1863 when the buildings were used as a hospital for both armies during the Civil War. In 1865 departments of medicine and law were added. In 1878 it was divided into South

Carolina College and Claflin College, the first for white, the second for colored students. In 1882 new departments were added to South Carolina College, it ceasing to be merely a college of agriculture and mechanical arts, and in 1884 a law-school was added. In 1887 a college of pharmacy, a graduate department and a normal school were added. In 1890 the agricultural, mechanical, medical and normal courses were dropped, but in 1894 the last were restored. The university offers courses (1) in classics, Latin and science, Latin and literature or modern literature; (2) in mathematics, chemistry or chemistry and biology; (3) in normal studies; (4) in law; and (5) in graduate studies. The state gives 41 scholarships, one to each county, for normal students, and there are 12 other scholarships. The faculty numbers 25, the students 385 and the library 38,000 volumes. The college has no productive funds. Its income is, in the average, about $60,000.

South Dako'ta, a north-central state of the Union, familiarly styled the Coyote State. Its entire area is 77,650 square miles; length, 245 miles; extreme breadth 380 miles. Forming a rectangle, the state is bounded on the north by North Dakota, on the south by Nebraska, on the west by Montana and Wyoming and on the east by Minnesota and Iowa. It is traversed about its center from north to southeast by the Missouri, the chief settled and more fertile portion lying to the east of this river; while west of it are the Indian reservations and the mining region known as the Bad Lands together with the Black Hills. The total population of the state is 707,740. Of this total some 20,000 are Indians, the majority of whom live on reservations. Pierre is the capital, and the chief towns in order of population are Sioux Falls, Aberdeen, Lead City, Watertown, Huron, Mitchell and Yanktown.

Surface and Climate. The state has a dry bracing climate, with a mean annual temperature of 44.3° F., the warm chinook winds tempering the extreme cold and blizzards of winter. It has a light snow fall in winter and an average annual rainfall, especially in the settled and fertile eastern section, where farming is chiefly carried on. In the west much of the state is not only treeless, save in the region of the Black Hills, but is infertile, being for the most part covered with igneous rocks and coarse gravel which, unlike the glacial drift of New England, is singularly free from boulders. Mixed with the gravel is a rich vegetable mold, due in part to the decay of plants and in part to the decay of the gravel itself, thus making this one of the profitable regions for wheat raising. The famous Bad Lands are also distinguished by the great variety of curious and picturesque forms into which the streams have carved them. Slender columns of clay, capped by blocks of sandstone, which protect the soil immediately beneath them from the sculpturing of the rains, produce groups of what appear at a distance to be immense toadstools. The varieties of color in these clay columns, including cream, buff, pale green and grey, add greatly to the picturesque effect.

Agriculture and Manufacturing. While excelled by its sister state, North Dakota, in the production of the other cereals, it in turn excels its northern neighbor in the production of corn, owing to the fact that it lies farther south and, therefore, has a warmer climate. Potatoes, barley, flaxseed, hay and oats are inportant crops. Stock raising is an important industry, and the wool clip is in excess of 3,000,000 pounds. Over $5,000,000 in gold are taken annually from the Black Hills and a small amount of silver is mined, while there are fair returns from lead, copper and tin. Other mineral products include sandstone, limestone, clay and cement.

Commerce and Transportation. The mileage of the railroads of South Dakota exceed 3,947 miles, the chief lines on the east side of the Missouri being the Chicago, Milwaukee and St. Paul, the Chicago and Northwestern and the Great Northern. The Black Hills region in the southwest, with its principal mining towns of Lead City, Deadwood and Rapid City, is reached from railroads extending northward from Nebraska. The Missouri also is a chief artery of transportation. Banking facilities are good, there being 102 national banks which possess an aggregate capital of over four million dollars and individual deposits exceeding 27 millions. There are, besides, 502 state banks, with a combined capital of nearly $7,000,000, and over 43 millions of deposits. The assessed valuation of property (both realty and personal) is now very close upon 338 millions, showing an increase of over one hundred millions in five years.

Education. The total annual expenditure of public schools in South Dakota exceed four millions, nearly two millions being expended for teachers' salaries. Of the 167,020 of school population something over 120,000 are enrolled, though the average daily attendance is but 80,032. Besides, state normal schools located at Madison, Springfield, Aberdeen and Spearfish, by their excellent instruction and training, are constantly raising the standard of the educational service rendered by the schools. There is an agricultural college at Brookings rendering similar service to the state's agricultural development, and a school of mines at Rapid City. In the larger towns there are high schools. Higher education is represented by the following universities and denominational colleges; the University of South Dakota at Vermillion; Dakota Wesleyan University (Meth. Epis.) at Mitchell with 27 instructors and 375 students; Yankton College (Cong.) with 23 instructors and 224 students; Huron College (Presb.); Redfield College (Cong.); Sioux Falls College (Baptist); and Mennonite College at Freeman. Besides these institutions there are reformatory and penitentiary schools maintained by the state, schools for the blind and for deaf-mutes and asylums and hospitals for the insane.

History. (For the early annals and for the history of the Dakotas see NORTH DAKOTA). In 1828-30 a fort was erected at Pierre, which was subsequently sold to the Federal government. Late in the fifties settlement began at Sioux Falls and in the territory to the eastward, while Yankton became the territorial capital in 1863, which was removed 20 years later to Bismarck and, in 1889, to Pierre. An impetus was given to settlement by the construction of railroads, begun about 1872, and by the Custer discovery of gold in 1874 in the Deadwood district and the region of the Black Hills. The movement for statehood dates about from 1883, though it was not until 1889 that the state, and with it North Dakota, was admitted into the Union with a constitution of its own. Indian reservations were further opened to settlement in the nineties. Consult Child's *South Dakota;* Hagerty's *The State of South Dakota;* Beadle's *Dakota;* and Todd's *Hydrographic History of the State.*

South Dakota, University of, a co-educational institution, organized in 1882 at Vermilion, S. D., and mainly supported by the Legislature for the work it does in the geological survey of the state, though it is otherwise well-endowed by land-grants and other resources. Its courses of study embrace pedagogy, music, commerce and engineering as well as arts and sciences. It has a faculty of 50, a student attendance of 411 and a library of about 16,000 volumes. Its tuition fees are but nominal; while it has a loan-fund for the assistance of needy students.

South'ern Niger'ia. See LAGOS and NIGERIA.

South McAl'ester, Okla., a city, capital of the Choctaws, annexed in 1906; it is on the Choctaw, Oklahoma and Gulf, and Missouri, Kansas and Texas railways, about 50 miles south-southeast of Okmulgee, Creek Nation, and about 84 miles southeast of Fort Smith, Ark. It lies in a rich coal-mining district, and (besides several foundries, machine-shops and brick-plants) it has cotton compress establishments, flourmills, bottling-works, a tannery and macaroni, cigar and mattress-factories. Settled in 1885, the town was incorporated in 1899 and has since grown considerably. It is not a part of the city of McAlester. The combined populations of the two cities is 12,954.

South Mount'ain, Battle of, an engagement of the Civil War precipitated by Lee's first invasion of Maryland in Sept., 1862. The battle occurred on Sept. 14th on South Mountain, a continuation of the Blue Ridge north of the Potomac, and near Boonsboro, Washington Co., Md., when the Federal army under McClellan fell upon the Confederates under Lee at Turner's and Crampton's Gaps in the mountain-range. There was stubborn fighting all day, as the Union forces pressed the rebels back and finally compelled them to withdraw, leaving their dead upon the field. At Turner's Gap there was a loss of about 1,500 on each side, while 1,500 Confederates were taken prisoners. At Crampton's Gap the losses were close upon 500 on each side, besides 400 Confederates taken prisoners. The engagement is known in the north as the Battle of South Mountain, while in the south it was called the Battle of Boonsboro.

Sovietism (*sō-vĕt'izm*), the policy or beliefs of a Russian sect called Bolsheviki, or "the majority," operating as partisans and in government by means of soviets, or councils, and believing in the rule of manual workers and peasants and the abolition of private wealth. Sovietism was established in Russia when Lenin and Trotzky seized the government in November, 1917, after the revolution which ended the era of the czars. Soviet agents executed Nicholas II and his family.

South-Sea Scheme, called the South Sea-Bubble, was a plan orginated by Harley, Earl of Oxford, to provide for the extinction of the public debt. A company was formed to which was given the monopoly of the trade of the South Seas and of certain import duties. It agreed to pay the government six per cent. yearly on its debt of $50,000,000. The stock rose until it was quoted at 1,000, when some of the principal directors sold out. The bursting of the bubble followed, many large stockholders fled, and the excitement was so great that Parliament was summoned to decide on the best means of helping in the public distress. Though nothing fraudulent was proved against the directors, their property was confiscated for the benefit of the sufferers, and $35,000,000 due the government was remitted, but this only availed to mitigate very slightly the ruin wrought.

South'ern Cross, a group of stars in the southern hemisphere of the heavens, at a considerable distance from the south pole. The four principal stars form a rough cross. It was added to the list of constellations in 1679.

Southey (*south'ĭ*), **Robert,** an English poet, was born at Bristol, England, Aug. 12, 1774. He studied at Oxford. Coleridge and Southey married sisters, and after various experiments, reading law, a secretaryship in Ireland, two visits to Lisbon, with intervals in London, Southey settled at Greta

Hall in the English Lake-Country where Coleridge lived, and devoted himself to writing. For a long time he supported Coleridge's family as well as his own. His works number nearly fifty, filling more than 100 volumes, besides many contributions to periodicals. *Madoc, Curse of Kehama, Thalaba* and *Roderick* are among his longer poems, although he is best known by a few short ones, as *The Battle of Blenheim* and *How the Water Comes Down at Lodore*. His *Life of Nelson* is one of the best biographies in English literature. He wrote also in prose a *History of Brazil* and *History of the Peninsular War*. His works brought him a competency and were rewarded by a pension, an honorary degree and the offer of a baronetcy. In 1813 he was made poet-laureate. He died on March 21, 1843.

Spadix (*spā'dĭks*), a peculiar spike-like form of inflorescence of the *Aroids* in which the axis is fleshy. The minute sessile flowers occur only on the lower part of the axis as in Jack-in-the-Pulpit, or completely cover it.

See INFLORESCENCE.

Spain (*spān*), a republic of southwestern Europe, which, with Portugal, occupies the entire area of the Iberian Peninsula. It is bounded on the west by Portugal and the Atlantic Ocean; on the east and south by the Mediterranean Sea, and on the north by the Atlantic Ocean and the lofty Pyrenees Mountains which separate Spain from France. Continental Spain extends over an area of 190,050 square miles. Spain, including the Balearic and Canary Islands on the Mediterranean coast, occupies an area of 196,607 square miles, and Spain with its colonies in Africa, including Spanish Morocco (an area of 140,000 square miles), has an area of 334,783 square miles.

Surface and Drainage. The country is a high plain traversed by several mountain ranges, the highest points of elevation being in the Pyrenees and the Sierra Nevada. The highest peaks of the Pyrenees are Mt. Aneto, 11,168 feet, and Pic de Néthou, 11,151 feet. In the Sierra Nevadas rises Mt. Mulhacen, 11,420 feet. That broad Iberian tableland, which extends over three-quarters of the peninsula, yet at no place does it reach the sea, reaches to the Cantabrian Mountains on the north and the Sierra Morena on the south. From the valley of the Ebro on the north rise the mountains of Oca, the Sierra de Moncayo and the Idubeda Mountains. Four mountain ranges traverse the plateau, the Oca and Idubeda Mountains, separating the valley of the Ebro from the Duro Valley; the Guadarrama Range which divides the Duro from the Tagus basin; the Sierra de Toledo, which forms the watershed between the Tagus and the Guadiana. The Sierra Morena forms the northern wall of the Guadalquivir Valley.

The principal rivers of Spain include the Ebro, the Tagus, the Dauro, the Guadiana and the Guadalquivir. All of these waters, with the exception of the Ebro flow in a westerly direction to the Atlantic.

Climate. Isolated as it is from the rest of the continent by its position in the southwestern part of Europe, and because of its extremely mountainous surface, Spain endures a diversified climate. The eastern and southern regions of the country are exceedingly dry. Oftentimes no rain falls over a period of many months. In northwestern Spain, however, the rainfall is abundant, undoubtedly the heaviest in Europe. Over that broad central tableland, blow icy winds alternating with a burning sun. A sub-tropical climate prevails in southern Spain. Summers in this region are rainless and the winter season is mild.

Minerals. Since the earliest days of Spanish history, the mineral wealth of the country has been most extensive. There is an abundance of coal and iron, lead, copper, asphalt, tin, wolfram, manganese, and silver. Platinum has also been found in the country. The quicksilver mines of Almaden are the richest in Europe. Gold and silver were at one time found in Galicia, but to-day, silver is produced only in Guadalajara. Among the other important minerals of Spain are sulphate of soda, salt, sulphur and phosphorus, pyrite, tungsten, gypsum and soapstone. Iron abounds in the provinces of Vizcaya, Santander, Oviedo, Navarra, Huelva and Seville. Coal is produced in the mines of Oviedo, Leon, Gerona, Valencia and Córdoba. In 1929 it was reported that vanadium, a rare metal, had been discovered in Asturias. In 1930 there were 6,596,232 metric tons of coal produced. Other important mineral productions for that year, in metric tons, were: iron, 5,524,775; copper, 3,903,573; anthracite, 523,575; lignite, 388,032; lead ore, 166,803, and salt, 164,532.

Production and Industry. It has been estimated (1931), that 87.3 per cent of the soil of the country or 108,858,830 acres, is productive, or potentially so. Spain is, therefore, an essentially agricultural country. On September 15, 1932, the Republican Cortes voted the General Land Reform Bill which provided for the expropriation of land on a large scale. Under the provisions of the bill uncultivated land, and other land which might yield an increased production if submitted to proper cultivation, are to be expropriated. It further provides that estates belonging to the former aristocracy of Spain, devoted only to hunting and pleasure, shall be expropriated. The total area of Spain comprises 124,615,669 acres. In 1931, there were 4,720,661 acres devoted to olive culture, and 3,803,370 acres to vineyards. It was not until 1921 that Spain undertook the cultivation of tobacco. In 1931 the yield from 8,346 acres totalled 112.024 hundredweights. This total does not include the tobacco yield of the Canary Islands. The principal crops of Spain, with their productions in hundredweights in 1931, include: wheat, 73,170,660; barley, 39,505,966; oats, 12,096,904; rye, 10,720,586; beet root sugar, 57,124,168; cane sugar, 5,178,752; potatoes, 93,539,394; olives, 35,680,298, from which 7,022,792 cwts. of olive oil were produced, and almonds, 2,046,786. Esparto, flax, hemp, and pulse are also cultivated. Silk culture flourishes in Valencia, Murcia. There are approximately 619,000 beehives in Spain which yield annually about 3,000 tons of honey and 750 tons of beeswax.

In 1931 the livestock of the country included horses, 562,877; mules, 1,174,508; asses, 1,003,578; cattle, 3,653,667; sheep 20,046,532; goats, 4,607,946; swine, 5,102,165, and camels, 4,327.

The manufacture of cotton goods is one of the principal industries of Spain. This industry is largely concentrated in Catalonia. According to the industrial census of 1930 there were 60,083 looms, 5,820 of which were automatic, and 19,489 lace and knitting looms. In the woolen manufactures there were 6,700 looms with 274,800 spindles in operation in that same year.

There are about 165 paper mills throughout Spain, producing writing, printing, packing and cigarette paper. In 1930 there were twenty-nine glass factories in the country. In 1929 the production from twenty-five important cement factories in the country totalled 1,513,967 metric tons. There were 152,459 men, 4,359 women, and 15,887 boys and girls under eighteen years of age, working in the mines of the country in 1930. The mining and metallurgical industries were represented in the nation's industrial census by 1,124 factories in 1930.

The manufactures of Spain do not equal those of the Middle Ages when Spain was famous for its manufactures of wool and silk goods, as well as for arms.

Transportation. In 1930 there were 54,224 miles (87,318 kilometres) of highways and roads throughout the Republic. There were 2,600 kilometres of new motor roads completed in that year. The total length of railways in that same year amounted to 9,871 miles (15,895 kilometres), 7,348 miles of which are of normal gauge (1.67 metres) and 2,523 miles of which are of varying gauges. Spain has maintained, for strategic reasons, an official gauge of Spanish railways which differs from that of France. This policy has made it necessary for passengers to change trains at the frontier stations. In 1930 there were 838 miles of tramways in Spain. Private companies own the whole of Spain's railways. The majority of such companies have, however, obtained guarantees or subventions from the Government. The airway concession has been cancelled by the Republican Government. To-day there are two airlines in operation maintained by the State, the Madrid-Barcelona and the Madrid-Seville lines. A new company, the Lineas Aereas Intersulares Canarias, operates between Las Palmas and Santa Cruz de Tenerife.

Population. In 1931 the population of Spain was 23,656,300. According to an official estimate returned on April 5, 1933, the population had increased to 29,616,177, a total which includes the Balearic Islands (368,173), the Canary Islands (564,873), and the Spanish colonies (897,000). In 1927 the islands that form the Canary Archipelago were divided into two provinces by a decree of September 21. These provinces were named after their respective capitals, Santa Cruz de Tenerife and Las Palmas. The former province comprises the islands of Tenerife, Palma, Gomera and Hierro, while the latter is constituted by the islands of Gran Canaria, Lanzarate, and Fuerteventura and the small barren islands of Alegranza, Roque del Este, Roque del Oeste, Graciosa, Montana Clara y Lobas.

The principal cities of the Republic with their populations in 1931, are: Barcelona, 991,262; Madrid, the capital, 896,511; Valencia, 327,088; Sevilla, 231,049; Málaga, 191,611; Zaragoza, 177,250; Bilbao, 166,758; Murcia, 160,478; Granada, 118,905; Córdoba, 106,045, and Valladolid, 89,342.

Education. The Constitution of the Republic has provided that education throughout Spain should be free and compulsory. Although education is to be lay, the several churches are authorized, under State inspection, to teach their respective doctrines in their own schools. Spain is divided into eleven educational districts with the universities of the country as the educational centers. In 1930 there were 35,989 public schools and approximately 5,600 private schools in the Republic. The total enrollment numbered about 3,600,000 students. Secondary education is provided for by "institutions" or middle class schools. The law requires that there must be at least one such school in each province. In 1930 there were sixty-nine "institutions" in the country with an enrollment of 66,481 pupils.

There are eleven universities situated throughout the Republic at Barcelona, Granada, Madrid, Murcia, Oviedo, Salamanca, Santiago, Sevilla, Valencia, Valladolid, and Zaragoza. A medical and science faculty are maintained at Cádiz in connection with the University of Seville. An educational establishment is maintained in the Canary Islands, which is dependent on the University of Seville.

Government. On April 14, 1931, Spain was proclaimed a democratic Republic of workers of all classes, organized in a régime of Liberty and Justice. At that time, King Alfonso XIII, who had been King of Spain since his birth on May 17, 1886, left his country with Queen Victoria and the Royal Family to enter a self-imposed exile in France. This was the second Spanish Republic to come into existence, the first having continued from 1873 to 1875. The Republic constitutes an integral State consistent with the autonomy of the Municipalities and Regions. It has no official religion. Freedom of conscience is granted all citizens of the Republic. The official language of State is Castilian. The capital city and seat of government is Madrid.

On June 28, 1931, general elections took place throughout the country to summon a

"Constituent Cortes" for the purpose of drafting a Constitution and electing a President. Up to this time Niceto Alcala Zamora had served as Provisional President of the Republic. He was later elected the first constitutional President of the Republic.

Legislative power has been delegated to the people who exercise this right by means of the Cortes (single chamber), or Congress of Deputies. The 470 members of this body are elected by universal suffrage on the system of proportional representation for four year terms. Two sessions of the Cortes convene annually.

The President of the Republic, who is the Head of the State, is elected conjointly by the Cortes and a group of "compromisers" the number of whom are equal to that of Deputies. The "compromisers" are elected by equal, direct and secret universal suffrage. This Head of the State must, according to the Constitution, be a Spanish citizen over forty years of age, having full possession of his civil and political rights. He holds office for six years and may not be re-elected until six years after the termination of his last mandate. The President is empowered to appoint and dismiss the Premier, and upon the recommendation of this latter officer of State, may appoint and dismiss his Ministers. He is also empowered to declare a state of War, but his signature upon such declaration may only be affixed under the conditions prescribed in the Covenant of the League of Nations and after being authorized by a special law. In the event of Spain's withdrawal from the League of Nations, the President must be authorized by the Cortes before passing the notice of retirement.

The Tribunal of Constitutional Guaranty was created for the purpose of deciding upon the constitutionality of laws, protecting individual rights and adjusting any discrepancies and executive responsibilities that may arise.

Catalonia. On September 15, 1932, the Cortes approved the Catalan Statute which granted autonomy to the region of Catalonia. This region comprises the four provinces of Barcelona, Tarragona, Lerida, and Gerona. It extends over an area of 12,000 square miles. In 1930 the population was 2,490,889. The official language of Catalonia is both Castilian (Spanish) and Catalan. For intercourse with the rest of the Republic, however, the only official language is Spanish. The representative organism of this autonomous region comprises the *Generalidad,* a parliament composed of eighty-five members who are elected for five-year terms; the President of Catalonia, who serves a four-year term, elected by the Catalonian *Generalidad,* and the Executive Council. The first Parliament of Catalonia convened on December 6, 1932.

Two other regions, the Basque and Galicia, had, in 1932, announced their statutes to the Cortes.

History. The Phœnicians and Greeks were the earliest visitors to Spain, where they found a race already settled. The Greeks called these people Iberians. The race probably consisted of a number of different tribes. The Carthaginians made the first effort to occupy Spain, founding Carthagena and were expelled by the Romans in 206 B. C. The Roman conquest was completed in 19 B. C. when Augustus divided *Hispania,* as they called it, into three provinces. The country became a thorough Roman province, adopting the Latin language and the Christian religion. After the invasion of the Goths, Spain became a province of the Visigoths and thus remained until 573. In that year it became the seat of the Gothic kingdom, which was destroyed in 711 by the Arab and Moorish invaders. The Moorish kingdom in Spain which endured for three centuries, reached its highest prosperity in 756. Cordova, their capital, was the finest of western Europe, as may be seen in its grand mosque. The last stronghold of the Moors in Spain was Granada, which surrendered to the Spanish army on January 2, 1492. The different provinces of Christian Spain have at times been independent and then conquered and united. Alfonso I conquered Galicia, with a part of Leon and Castile, and called himself the king of the Asturias. Alfonso III, taking possession of the whole of Leon, called it the Kingdom of Leon. Navarre was an independent state in the ninth century, and became a powerful kingdom. Castile was first a republic, and at a later date was subject to Leon. It then became independent again and remained so until Ferdinand the Great united it with Leon. Aragon, first a part of Navarre, became an independent kingdom, and then was united with Catalonia. In 1037 the union of Leon, Castile and Galicia made Ferdinand the Great the most powerful ruler in Spain. The marriage of Isabella of Castile with Ferdinand of Aragon united those kingdoms, and the conquest of Granada completed the consolidation. These factors together with the conquest of Naples, the discovery of America by Columbus and the possession of large parts of the new continent, raised Spain to a high place among European nations. Philip II exhausted the strength of the country in his wars with the Netherlands, in his great preparations for the Invincible Armada and in building the Escorial. The great kingdom he had inherited from his father, Charles V, began to show decline. Spain allied with the emperor in the Thirty Years' War, but received nothing in return, and soon became a subject of contest between the different European powers. Philip V was the first of the Bourbon kings of Spain, whose accession led to the war of the Spanish Succession, ending in the peace of Utrecht in 1712. From 1808 until 1813 Joseph Bonaparte was king of Spain, although the people did not acknowledge him. Ferdinand VII was restored to power in 1814, and by the help of the French triumphed over the Liberal party in the kingdom. Florida was sold to the United States, and a large part of the South American colonies were lost during this reign. During the regency of Christina and the reign of Isabella, the Liberal party gained ground until Isabella fled to France in 1878, resigning in favor of her son, Alphonso XII. A provisional government existed for two years, followed by a short reign by Amadeus of Savoy. There finally arose a republic which ended with the second Carlist war (1872-1876). Don Carlos, who claimed the throne as a brother of Ferdinand, withdrew to France, and Alfonso XII ascended the throne and reigned for eleven years. Alfonso XIII, was born in 1886, but the country was governed by his mother as queen-regent until 1904. During 1868-78 Cuba struggled unsuccessfully for independence, Campos of Spain distinguishing himself then and again in 1895. The second revolt of Cuba (that of 1895), gave rise to the Spanish-American War of 1898, which resulted in the complete destruction of the Spanish fleet and the loss of all colonies, save those in Africa.

In 1906, Alfonso XIII, the then reigning monarch of Spain, married Princess Victoria Eugenie, the daughter of Prince Henry of Battenberg and the youngest sister of King Edward VII. An attempt was made on their wedding day to assassinate the sovereigns, and the bomb explosion killed several in the streets of Madrid. Later in this same year Alfonso signed an ordinance which declared the validity of the civil marriage of Catholics, an act which caused great disturbances among the Catholic clergy. In 1910 the quarrel with the Vatican began to take on a more serious aspect. On June 11, of that year, a royal ordinance was issued which cancelled the prohibition of "any emblem, attribute or lettering on the exterior walls of any place of worship other than Catholic." The disturbances which developed among the clergy as a result of this ordinance, finally led to the recall of the Spanish Ambassador at the Vatican. On November 4, 1910, the Cadenas Bill was passed by the Senate which forbade the establishment of any more congregations in Spain until the Vatican difficulties were satisfactorily settled.

During the World War, Spain maintained that neutrality which it had declared in 1914. The country successfully withstood all German propaganda and surmounted the difficulties incurred by German interference with Spanish commerce. Much internal dissension prevailed throughout the country during these years and for several months in 1917 martial law existed in Spain.

In 1923, General Primo de Rivera, controlling the army, forced the cabinet to resign by royal decree of King Alfonso. He then caused the king to appoint him president of the national directorate, the name given a new national body composed of one general of each of Spain's nine divisions, and the admiral of the navy. The legislative body, called the Cortes, was in recess, and remained so until 1924, when de Rivera caused the king to demilitarize the directorate and make the ministers again responsible to the crown. The expressed aim of the General was to develop an efficient government, and under which the commercial and industrial district of Catalonia, in which Barcelona is situated, might be free to expand its business interests. The dictatorship established by General Primo de Rivera lasted until January, 1930.

In 1925 the armies of both Spain and France were necessary to combat the Riffian tribesmen of Spanish and French Morocco, under the leadership of Abd-el-Krim.

Soon after General de Rivera's retirement, the unrest which seemed to be dominating Spanish life and politics, gave rise to vehement cries for a republic. On April 12, 1931, a republican victory was won at the municipal elections. Alfonso XIII and the royal family fled to France and Spain again became a republic.

As the second Spanish Republic approached its third anniversary, internal dissension continued to rifle its stability. Labor and Capital have been waging a struggle which has thus far been futile, and the political strife between the Right and the Left seems to forewarn of violent civil war. Like the first republic, the government has been supported chiefly by the working classes, but unfortunately the government has deemed it unwise to concede to the demands of this group of citizens for land and church reform. The enthusiasm of the working classes has been quelled either by law or armed suppression. This element of the population is not seeking to destroy the Republic but to establish a democratic and progressive republic, which will bear no traces of a monarchial régime. It is towards this end that the revolutionary movement has been working.

In March, 1934, Alejandro Lerroux and his Cabinet resigned following the difficulties which arose over the decree requiring official permits for funerals conducted under religious ceremonies. President Zamora appealed to Senor Lerroux to organize a new Cabinet. The latter formed a Ministry which leaned more strongly toward the Right than his first Cabinet had.

Meanwhile in Catalonia the revolutionary movement was gaining new ground rapidly. Workingmen's unions allied with the Syndicalist unions to resist the efforts of the Right wing to the liberal republican régime. Open revolt has been seething throughout the country. Industrial strikes steadily increased during 1934, and were extended to builders, metallurgical and newspaper trades, with the exception of the Catholic journal *El Debate*. Labor districts, public buildings and streets in Madrid were closely patrolled by police guards to prevent any major acts of violence. A decree proclaiming martial law was held in readiness for instant use should the situation become uncontrollable. In March, at Zaragoza, a group of Extremist prisoners gave vent to their radicalism by attacking a judge, government attorney and court stenographer in the jail there. The Governor ordered all strikers to return to their work immediately. A "state of alarm," similar to martial law, embraced Spain.

One aim of the Right which they advocated in their moderate program was realized when on March 24, new amnesty laws were presented to the Spanish parliament. Under the amnesty, which became effective on April 14, 1934, hundreds of political offenders were liberated. The law applies only to that group, however, who were sentenced prior to December 3, 1933, and does not extend to the anarchists guilty of complicity in the December revolt.

The amnesty submitted to parliament by Prime Minister Lerroux met with strenuous opposition from the Moderate group and Left Republicans. They regarded the law as "dangerous folly at a time when the republic is regarded as none too secure." The Right wing, on the other hand, strongly advocates the law which extends amnesty to all those convicted of "seditious utterances by word or pen and acts of offence against the head of the state or parliament," as well as to those persons who were convicted by emergency tribunals and participants in illegal strikes or riots.

Spalding, Albert, a noted American violinist, was born in Chicago, Illinois, in 1888. He studied under Buitrago in New York, under Chiti in Florence, and under Lefort in Paris. It was in the latter city that the young violinist made his successful debut in 1905. The instant acclaim which Spalding won upon his appearance in Paris soon brought him fame as a prodigy. A short time later the young and talented musician began a tour of Germany, France, and England. He made his first public appearance in the United States in 1908, with the Damrosch Orchestra. After appearing in several leading American cities, Spalding visited Egypt, Italy, Russia, the Netherlands, and Scandinavia. In 1912 he made a second concert tour in the United States. After his appearance here in 1914, the famous violinist appeared annually in the United States, each time winning greater acclaim. To-day, Albert Spalding has won international fame as a violinist, and has appeared in practically every country of Europe on concert tour.

During the World War, Spalding served as First-Lieutenant in the United States Air Service in Italy and France. He also served on the joint Army and Navy Aircraft Board. His training as a flyer was obtained as he observed aviators in action in Italy.

Spalding is also renowned as a composer of much entrancing music for both violin and orchestra and other orchestral arrangements. His most famous works include: *Concerto quasi fantasia; Suite for Piano and Violin,* and *Sonata for Piano and Violin.* He is the composer of about twenty violin compositions. Spalding's fame has spread throughout the entire musical world.

Spalding, John Lancaster, an American Roman Catholic bishop, was born at Lebanon, Kentucky, on June 2, 1840. He was educated at St. Mary's College at Emmetsburg, Maryland. He received the degree of D.D. at Louvain, Belgium, in 1863. After his ordination he studied at Rome, Italy, and returned to the United States at the age of twenty-five. He became secretary and chancellor of the diocese of Louisville, at which time he took part, as a theologian, in the second plenary council of Baltimore. He at several times refused to accept elevation in the church. Bishop Spalding was stationed in New York from 1872 to 1877. In the latter year he was consecrated Bishop of Peoria. As a writer Bishop Spalding was even better known than as a prelate, and as a lecturer he held a distinguished place in this country. His literary style has been compared to that of Emerson. He attained fame as an arbiter of labor disputes. In 1902 President Theodore Roosevelt appointed him as one of the arbitrators in the anthracite coal strike. Among his published works are *Socialism and Labor; Thoughts and Theories of Life and Education; Education and the Higher Life,* and *Things of the Mind.* In addition to his active interest in secular educational institutions and movements, he gave much of his time and thought to the furtherance of higher education within the Church, and was practically the founder of the Catholic University at Washington. He died on August 25, 1916.

Spalding, Martin John, a distinguished American Roman Catholic prelate, was born near Lebanon, Kentucky in 1810. He was educated at St. Mary's Seminary and St. Joseph's Seminary, both of which are situated in Kentucky. He also studied in Rome, Italy. In 1834 he was ordained to the priesthood. During the next ten years he held several charges in Kentucky. In 1844 he was appointed vicar-general of Louisville. Four years later he became Coadjutor-Bishop of Louisville, and Bishop of the same diocese in 1850. In 1864 he was appointed Archbishop of Baltimore. Among the important publications of Archbishop Spalding are *Sketches of the Early Catholic Missions in Kentucky* (1846), and the *History of the Protestant Reformation* (1860). This distinguished prelate was also a founder of and writer for the *Catholic Advocate.* Archbishop Spalding died in 1872.

Spandau (*shpän'dou*), a German town and strong fortress, is situated on the Spree River, eight miles northwest of Berlin. Before the World War, it was a most important stronghold for Berlin. As it defends the capital on that side, Spandau is very strongly fortified, and in its citadel, the Julius tower, was kept the reserve fund of $30,000,000 for immediate use in war emergency. This money was part of the war indemnity paid by France after the Franco-German War. The town is now chiefly famed as the shipping center for an extensive trade between Berlin and Hamburg. There are fisheries, and markets for horses and lumber. Its chief manufactures are porcelain, woolens, and cloth. The population is approximately 95,000.

Spanish Africa. The ancient far-flung colonies of Spain in North and South America, the Atlantic, Caribbean Sea, and the Pacific have all been lost. The nation holds only a few of her former large blocks of territory in Africa. The Canary Islands, off the northwestern coast, are administered as a part of Spain itself. They extend over an area of 2,807 square miles. Ceuta, across from the Spanish town of Cadiz, is united with the province of Cadiz. Morocco, once wholly a Spanish colony, has been limited in extent. Over it Spain acts as a protectorate of the northern border strip on the Mediterranean, while France controls the southern portion bordering the Sahara. On the west coast Spain controls Rio de Oro and Adrar; Spanish Guinea; and Fernando Po, Annobon, Elobey, Corisco and other islands of the Gulf of Guinea. The total area is 128,696 square miles.

In Rio de Oro and Adrar the principal occupation is fishing. Ifni ceded by Morocco, is also engaged in fishing, and in the cultivation of dates and garden produce. Fernando Po is one of the most fertile spots on the western coast of Africa. There is luxuriant vegetation on the mainland strip of the Gulf of Guinea, and some Spanish, French and English factories along the coast. All of the Gulf colonies are under control of a Governor, resident at the capital, Santa Isabel. Catholics and American Presbyterian missions are established here. The total population of Spanish Africa in 1931 was approximately 784,341, exclusive of the Canary Islands, which had a population of 564,873.

Spanish-American War. The people of the United States had long watched the struggle of the Cubans against the tyranny of Spain, and with deep sympathy and indignation had witnessed the inhuman cruelties with which the war had been waged on the part of Spain. The devotion of the Cubans to their cause, the brutality with which the peaceable inhabitants of the island were treated and the inability of our government to induce Spain to adopt reforms that would be acceptable to the Cubans made intervention a duty the United States could not evade. The tension of the situation was increased by the destruction of the United States battleship *Maine*, by an explosion while on a friendly visit in the harbor of Havana on the fifteenth of February, 1898. Of her crew, 266 men, including two officers, were killed. A naval court of inquiry after thorough investigation declared it to be their opinion that the *Maine* was destroyed by a submarine mine. The American people, while not asserting that the act was one of treachery on the part of the Spanish government, did believe that without complicity on the part of Spanish officials at Morro Castle, the vessel would not have been blown up by mines operated by electric batteries located within that fortification.

Matters now drifted rapidly toward war. On April 11, 1898, President McKinley sent a message to Congress in which he declared that he had exhausted every effort to prevent a resort to arms. On April 19, Congress passed the following preamble and resolutions:

Whereas, The abhorrent conditions which have existed for more than three years in the island of Cuba, so near our own borders, have shocked the moral sense of the people of the United States, have been a disgrace to Christian civilization, culminating as they have in the destruction of a United States battleship, with 266 of its officers and crew, while on a friendly visit in the harbor of Havana, and cannot longer be endured, as has been set forth by the President of the United States in his message to Congress of April 11, 1898, upon which the action of Congress was invited; therefore,

Resolved, 1. That the people of the island of Cuba are and of right ought to be free and independent.

Resolved, 2. That it is the duty of the United States to demand, and the government of the United States does hereby demand, that the government of Spain at once relinquish its authority and government in the island of Cuba and withdraw its land and naval forces from Cuba and Cuban waters.

Resolved, 3. That the President of the United States be, and he hereby is, directed and empowered to use the entire land and naval forces of the United States and to call into actual service of the United States the militia of the several states, to such extent as may be necessary to carry these resolutions into effect.

Resolved, 4. That the United States hereby disclaims any disposition or intention to exercise sovereignty, jurisdiction or control over said island, except for the pacification thereof, and asserts its determination, when that is accomplished, to leave the government and control of the island to its people.

On April 21, the American Minister at Madrid received passports from the Spanish government, and on the same day the Spanish minister left Washington. On April 24, Spain issued a declaration of war with the United States, and next day the American Congress issued a similar declaration. The president issued a call for 125,000 volunteers, and the equipment of army and navy was vigorously pushed. The first action of importance was the naval battle in Manila Bay. At daybreak on May 1, Commodore Dewey, in command of the Asiatic squadron of the United States navy, entered the harbor. His squadron consisted of the cruisers *Olympia* (flagship), *Raleigh*, *Baltimore* and *Boston*, and gunboats *Concord* and *Petrel* and the revenue-cutter *McCulloch*, with two transports. Here he met the Spanish fleet, consisting of the *Reina Cristina*, *Castilla*, *Don Antonio de Ulloa*, *Isla de Luzon*, *Isla de Cuba*, *Gen. Lezo*, *Marquis de Duero*, *Cano*, *Velasco*, *Isla de Mindanao*, some small gunboats and a transport. The result of the battle was the entire destruction of all the Spanish vessels and the silencing of the land-batteries. Commodore Dewey did not lose a ship or a man.

Spain sent to the defense of Cuba a fleet under command of Admiral Cervera which took a secure position in the harbor of Santiago. The city was also garrisoned by a Spanish army under General Linares. This site became the objective point of American attack.

The American fleet, under Admiral Sampson (*q. v.*), being unable to enter the harbor, which was thoroughly protected by fortifications, took position before the entrance, to prevent egress of the Spanish fleet. An American army of 15,000, under Major-General Shafter (*q. v.*), landed at Baiquiri, near Santiago, June 23. Advancing, they encountered a Spanish force at Las Guasimas on June 24, and a sharp engagement was fought, the enemy being driven back. On July 1 a severe and decisive battle was fought on the heights of San Juan and El Caney, overlooking Santiago, resulting in the defeat of the Spaniards. General Linares was wounded. General Vara del Rey, second in command, was killed, and the command of the Spanish forces, which withdrew within the fortified lines of the city, devolved on Gen. José Toral.

On July 3 the Spanish fleet under Admiral Cervera attempted to escape from the harbor of Santiago. As the vessels appeared in line they were pursued by the *Brooklyn*, the *Oregon*, the *Iowa* and the *Texas* of the American squadron and the converted yacht *Gloucester*. The Spanish ships *Maria Teresa*, *Almirante Oquendo* and *Vizcaya* were within a few minutes forced ashore and surrendered. The *Cristobal Colon* made a desperate attempt to escape, but was run ashore and sunk about 60 miles from the mouth of the harbor. The two torpedo-boat destroyers, *Furor* and *Pluton*, were wrecked within four miles of the harbor. Admiral Cervera, Captain Eulate and more than 1,300 officers and men were taken prisoners. The loss of life on the Spanish vessels was large, while on the American fleet only one was killed. None of the American vessels was injured seriously in the engagement.

On July 17 General Toral surrendered to General Shafter his army and the city and province of Santiago de Cuba, which embraced all eastern Cuba. An American army under General Miles landed on the island of Porto Rico at Guanica, July 25, and advanced toward San Juan, occupying various points without serious fighting. On Aug. 12 a peace-protocol, suspending hostilities and providing for the appointment of commissioners to treat of peace between Spain and the United States, was signed at Washington, the French minister, M. Cambon, acting in behalf of Spain. The American troops, under General Merritt and the fleet under Admiral Dewey made a combined attack on Manila, August 13, and after six hours' fighting the Spaniards surrendered the city with 7,000 prisoners.

The peace-commissioners appointed by Spain and the United States met at Paris, Oct. 1. The United States commissioners were William R. Day of Ohio, Senators William P. Frye of Maine, Cushman K. Davis of Minnesota and George Gray of Delaware, with Mr. Whitelaw Reid of New York. After lengthy deliberations a treaty of peace was signed, Dec. 10, 1898. By this treaty Spain relinquished all claim of sovereignty over or title to Cuba, and ceded to the United States Porto Rico, Guam and the Philippine Islands; the United States agreeing to pay to Spain the sum of $20,000,000. The close of the war, which lasted only 113 days of actual hostilities, left Spain with no colonial possessions in the western hemisphere. See PHILIPPINE ISLANDS and PORTO RICO. See *History of the Spanish-American War* by H. Watterson.

Sparks, Ja'red, an American historian, was born at Willington, Conn., May 10, 1789. He studied at Harvard, settled as a Unitarian minister at Baltimore, and finally became editor of *The North American Review*. He was ten years a professor of history at Harvard, and for four years its president. His writings include *John Ledyard*, *Gouverneur Morris* and *Library of American Biography*, in ten volumes. He edited the *Works of Benjamin Franklin*, the *Writings of George Washington* and *Correspondence of the American Revolution*. He died at Cambridge, Mass., March 14, 1866 See *Memoir* by G. E. Ellis.

Spar'row, any one of various small birds belonging to the finch family. They are plainly colored and usually have their plumage streaked with brown, black, gray and rusty. About 30 common varieties are found in the United States, and among them are a number of good singers. They are hardy birds, feeding on seeds, and some kinds are to be seen in any month of the year. Some kinds go south at the approach of winter, others are permanent residents, and still others come from the far north, where they nest, to spend the winter in the United States. The song-sparrow is one of the commonest and rears three broods a year. The chippy is very common about our yards and houses. The most persistent is an imported bird — the common European house-sparrow or English sparrow, which was introduced into the United States about 50 years ago. Although destroying many caterpillars, it drives other birds before it and has become a nuisance and a pest, but they are too numerous and multiply too rapidly to be easily got rid of. Other well-known kinds are the fox-sparrow, swamp-sparrow, tree-sparrow, field-sparrow and the white-throated sparrow.

Sparrow-Hawk, a small falcon, abundant in the United States. It is about 11 inches long, with a tawny plumage, marked with bluish and black, a rusty-colored crown and a chestnut tail. There is considerable variation in its plumage. Notwithstanding its small size, it is one of the most active and courageous of birds. The sparrow-hawk is the American representative of the European kestrel, which is a larger but similar bird. It feeds upon mice, grasshoppers and other insects. Its nest is usually in a hollow tree.

Spar'ta, the ancient Lacedæmon, the famous Greek city, was in the southern part of Greece on the Eurotas, about 20 miles from the Mediterranean. It was shut in by mountains, one, Mt. Taygetus, rising 8,000 feet; and the valley was so easily defended that it was not regularly fortified until 195 B. C. The city had few fine buildings; the Acropolis was a steep hill with a temple to Athena on its summit, and the white marble theater was one of the largest buildings. The city was formed from several scattered hamlets, and was governed by two kings, whose powers were equal, and who at first were priests, judges and generals as well as rulers. There were three classes of citizens; the Spartiatai or governing class, the Perioikoi, who were free but had no voice in matters of state, and the Helots or slaves, who were bound to the soil, cultivating it for its owners, and were also employed in war. The greatness of Sparta is due to the laws of Lycurgus, which made it a nation of soldiers. There is some doubt resting on the received traditions of Lycurgus, but there certainly was a very ancient legal code, dating back to 825 B. C. The citizens, according to this code, lived only for the state, and children were under the public care. If deformed or weak, they were not allowed to grow up; if healthy, they were taken from the mother when seven years old, and drilled in military exercises, in habits of endurance and skillfulness and in speaking short sentences, to the point, which last gave rise to the expression, "laconic," from the name of the province, Laconia. Their training is illustrated in the story of the boy with the stolen fox, who was applauded because he bore the torture of the desperate animal tearing his flesh rather than by crying out and confessing that he had stolen him. Between the ages of 20 and 60 all Spartans served in the army, and, though allowed to marry and to engage in business, ate and slept in the public barracks. The early struggles of Sparta with Messenia, Argos and Athens, gave Sparta the victory and made it the chief power in Greece, but its tyranny induced rebellion, and the Thebans under Epaminondas reduced Sparta to its old boundaries. The Macedonians still further cut off its provinces, and finally, with the remainder of Greece, it became a part of the Roman empire. The modern town of Sparta, founded by the Greeks in 1836, the capital of Laconia, occupies a part of the site of ancient Sparta.

Spartacus (*spär'tă-kŭs*), a leader in a revolt of Roman slaves, about 73 B. C., was born in Thrace. He was first a shepherd, then the head of a band of robbers, and when taken was sold to a trainer of gladiators at Capua. He escaped with 70 others and fled to the crater of Vesuvius. Here he was joined by many runaway slaves, conquered all forces sent against him, and sacked many of the cities of southern Italy. His army increased to 100,000 men, whom he sought to induce to march across the Alps and to seek their old homes, but the fever of revenge and conquest was upon them, and Spartacus continued his fight with the Roman authorities. At last he was defeated by Crassus in 71 B. C. while trying to seize the shipping at Brundusium, and was slain at Petelia.

Spar'tanburg, S. C., capital of Spartanburg County, on the Glen Springs, Charleston and Western Carolina and Southern railroads. It lies 94 miles northwest of Columbia, the capital, and 72 miles southwest of Charlotte, N. C. It is the seat of Converse College and of Wofford Methodist Episcopal College, and has a number of churches, schools and other public institutions. It has extensive cotton manufactories and has been called the Lowell of the South. This industry has greatly advanced the growth and prosperity of the city. Population 30,000.

Spathe (*spāth*), the very highly developed bract which invests the spadix. In Jack-in-the-pulpit it is tubular below, and spreads above into an overarching hood In the calla lily it is very large, and beautifully white. The spadix with its spathe is characteristic of the Aroids, and in the numerous tropical forms the spathe is extremely varied in form and often brilliantly colored.

Spe'cie Payments in the U. S., Suspension and Resumption of (1861–79). In consequence of the Civil War and the beginning of the drain on the United States government to meet its current obligations in metallic money, the nation, following the action of the banks, suspended specie payments at the close of 1861 and resorted to the issue, in large sums, of legal-tender paper-money ("greenbacks" the notes were called) in lieu of gold and silver in the payment of debts and taxes. The suspension, which lasted until Jan. 1, 1879, had the effect of depreciating the national paper-currency to half its face-value in gold; though, when the war closed, the government, in pursuance of an honest financial policy, began to redeem its obligations with coin and stopped the issue of the U. S. legal-tender notes. This had its effect on the national currency, which began steadily to rise in value. The government finally grappled with the financial problem and solved it by announcing that on Jan. 1, 1879, the resumption of specie payments would take place. The government kept faith with its creditors and the nation on the day specified, when, through the sale of bonds and the accumulation of surplus revenue etc., gold and silver were once more paid out. The result proved the wisdom of the government and banished all misgiving, for, when 1879 opened, only about 11 or 12 million dollars' worth of notes were offered for redemption, while the treasury at Washington had in its possession about ten or twelve times the amount in gold in its vaults.

Specif'ic Grav'ity. See DENSITY.

Specific Heat, a term used in the physical sciences and in engineering to denote *the quantity of heat necessary to raise the temperature of one gram of a substance through one degree centigrade at any given temperature.* This quantity of heat is known as the specific heat of that substance at that temperature. If we use the *calorie* as the unit of heat, an exactly equivalent definition of specific heat is the following: *The ratio between the amount of heat required to raise the temperature of any body one degree and that required to raise the temperature of an equal mass of water one degree.*

The following is a table of specific heats of some of the more common substances:

Aluminum	0.214	Tin	0.056
Sulphur	0.203	Iodine	0.054
Iron	0.114	Antimony	0.051
Copper	0.095	Mercury	0.033
Zinc	0.095	Platinum	0.032
Silver	0.057	Lead	0.031

See HEAT.

Spec'tacles are instruments used for aiding the sight. They are said to have been invented in the 13th century. The first ones were very clumsy, and there was very little improvement until the beginning of the 19th century. Spectacles are worn for strengthening the vision, when it is weakened by old age, or to remedy any natural defect, such as nearsightedness, and also to protect the eye from too strong light. The glasses or lenses used should be made of the best of glass and carefully ground, though sometimes they are made from rock-crystal and called "pebbles." The glasses should be very carefully selected to accomplish the purpose intended, it being often necessary to fit each eye separately. For short sight or nearsightedness the lens is concave, and the weakest glass that will permit distant objects to be seen should be used. For the weakness of old age, which is farsightedness and is first noticed by one's holding a book farther off in reading etc., the lens is convex, and the strongest glass should be used.

Spec'trograph. See SPECTROSCOPY.

Spec'troscope. See SPECTROSCOPY.

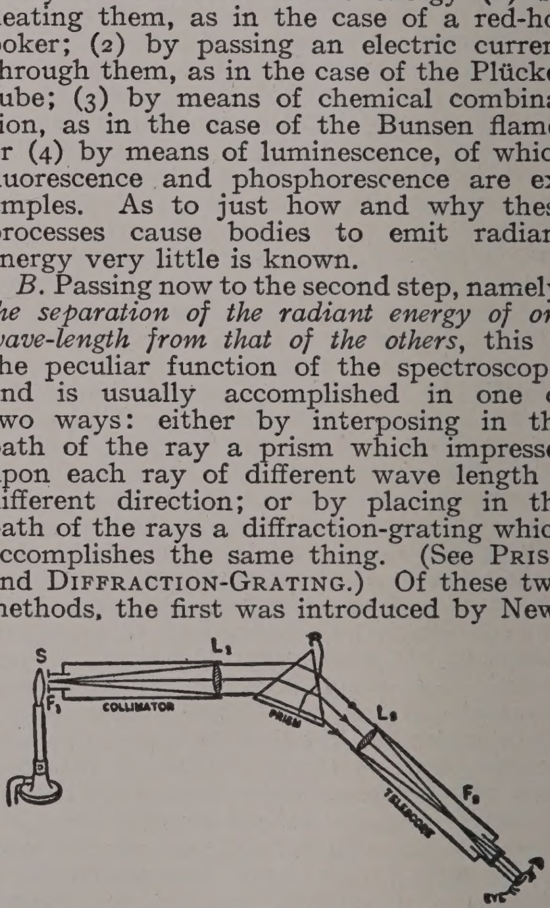
Spectroscopy (*spĕk-trŏs'kō-pȳ*) is a science which has for its object the determination and description of the various radiations which bodies emit, reflect and absorb. It is to be carefully noted that spectroscopy does not end in the observation of phenomena, but includes also the description of these phenomena in a manner which is at once the simplest and most complete.

METHOD OF SPECTROSCOPIC SCIENCE

The examination of a body by means of the spectroscope includes four steps. These are *the Production of Radiation; the Separation of the different Radiations; the Recording of the Radiations;* and *the Comparison of the Radiations.* We shall consider the subject from these four points of view.

A. What the spectroscope receives and analyses is radiant energy. It follows naturally, therefore, that *the first step* in examining the spectrum of any body *is to make that body a source of radiant energy.* In many cases this step has already been performed for us. Thus the fixed stars and the gases in which lightning-discharges occur are already rendered self-luminous. All we can do, therefore, is to *observe* their spectra; we cannot *experiment* upon them. Bodies at the surface of our earth can generally be made to radiate energy (1) by heating them, as in the case of a red-hot poker; (2) by passing an electric current through them, as in the case of the Plücker tube; (3) by means of chemical combination, as in the case of the Bunsen flame; or (4) by means of luminescence, of which fluorescence and phosphorescence are examples. As to just how and why these processes cause bodies to emit radiant energy very little is known.

B. Passing now to the second step, namely, *the separation of the radiant energy of one wave-length from that of the others*, this is the peculiar function of the spectroscope, and is usually accomplished in one of two ways: either by interposing in the path of the ray a prism which impresses upon each ray of different wave length a different direction; or by placing in the path of the rays a diffraction-grating which accomplishes the same thing. (See PRISM and DIFFRACTION-GRATING.) Of these two methods, the first was introduced by Newton about the middle of the 17th century, and the second by Fraunhofer near the beginning of the 19th century. The ordinary prism-spectroscope, shown in figure 1, is



A PRISM-SPECTROSCOPE ADJUSTED TO VIEW ONE PARTICULAR COLOR IN THE SPECTRUM generally made up of three parts, viz., a prism and two astronomical telescopes. One of these telescopes is used to render the rays which fall on the prism parallel to each other, and is therefore called the *collimator.* The other telescope is made movable so that it can be turned into the proper direction for observing any desired color, and is, therefore, called the *view-telescope.* A *grating* spectroscope is essentially of the same construction (see figure 2) except that the dispersion, *i. e.*, the separation, of the rays is produced by the grating at G, instead of by a prism. The radiant energy is here admitted through the small narrow opening at S_2, called the *slit.* An image of this slit is produced in the focal plane of the view-telescope, and in the ordinary spectroscope is there examined by means of an eyepiece. But, if we place a small camera at the end of the view telescope in such a position that the photographic plate will lie in the focal plane of the telescope, we can then obtain a photograph of these images. Such an instrument is called a *spectrograph.*

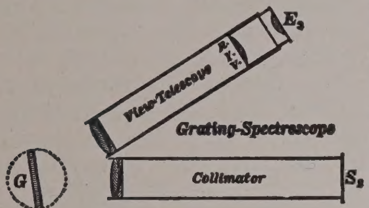


FIG. 2

Among the most powerful spectroscopes known must be mentioned the curved grating instrument devised by Rowland. For the best account of this see Kayser's *Handbuch der Spectroscopie.* In the same class must be mentioned Michelson's echelon spectroscope, which is well-described in Drude's *Lehrbuch der Optik.*

C. Passing now to *the manner in which spectra are recorded,* this depends partly upon the portion of the spectrum under examination and partly upon the purpose of the examination. If it is merely the appearance of a line, a glance of the eye may suffice, provided the line is in the visible part of the spectrum.

But in the ultraviolet part of the spectrum photography is practically the only available means for obtaining a record. In the infrared portion of the spectrum we cannot see and cannot easily photograph what is there; so that here the radiomicrometer or bolometer or radiometer must be used. In general, photography is the best and most easily worked method whenever it is applicable.

D. *Comparison of Spectra.* Let us suppose now that by some means we have analyzed the radiation from a certain body and have recorded its spectrum. The next step in the process is to apply this information to the purpose for which it was obtained. This last step — the interpretation of results — perhaps is the most important one of the four, and the one which demands, in its execution, the largest measure of care and experience. After a spectrum is once obtained it becomes generally necessary to compare it (1) with itself when the radiation is produced under different conditions; (2) with itself when recorded in another way; (3) with the spectra of other bodies; (4) with some spectrum which has been predicted by theory; or (5) with a standard scale of wave-lengths; that is, with an ideal spectrum in which each line differs from its neighbor by one of the units in which wave-lengths are measured.

HISTORY OF SPECTROSCOPY

A bare outline of the steps by which this science has reached the high degree of perfection which it to-day possesses would be something like the following:

1. Newton, by his careful study of the prism, gave a fairly complete answer to the question of separating the various radiations.
2. Young and Fresnel, by establishing the wave-theory of light along the lines laid down by Huygens, placed spectroscopy upon a sound scientific basis.
3. Fraunhofer, by inventing the diffraction-grating, greatly increased the power and simplicity of the instrument.
4. Kirchhoff and Bunsen (1859) showed that each chemical element emits a characteristic radiation and, thereby, established the science of spectrum analysis.
5. Rowland, by the perfection of the plane grating and by the invention of the curved grating, as well as by his superb published spectra of the sun and elements, revolutionized the entire science and gave it a precision hitherto undreamed of.
6. Kayser and Runge, by their study of the spectra of the elements, have shown that there is an order, and not a chaos, running through the thousands of lines already mapped.
7. Michelson (1890–1900) has shown us how a single line in any spectrum may be analyzed and studied in detail; and has thus, at once, multiplied the power and the problems of the science. This he has accomplished by the invention and use of the interferometer and the echelon spectroscope. Kayser's *Handbuch der Spectroscopie* is incomparably the best treatise ever written on this subject. HENRY CREW.

Spec'trum. If a prism or a diffraction-grating be interposed in the path of a beam of white light, it will, provided the beam of white light be small, spread this beam out into a colored band in which the colors are arranged in the following order: *red, orange, yellow, green, blue, violet.* This colored band is called the *spectrum* of white light.

If, instead of a pencil of white light, we had passed through the prism a pencil of light from the Bunsen flame, it too would have been separated into its constituent colors, in this case *green*, *blue* and *violet*, which are the spectrum of the Bunsen flame. If an electric arc had been employed, we should have obtained the spectrum of the electric arc, even though a large part of the radiation from the arc is invisible—has no color—and must be detected by the photographic plate.

So we define the spectrum of any body as the *ensemble* of its radiations visible and invisible, arranged in the order of their wave-lengths. See SPECTROSCOPY.

Spectrum Analysis, the act of ascertaining the character and composition of luminous bodies by causing a ray of light from the body to pass through a prism, each substance in the spectrum having its own characteristic system of lines—as in a star, a planet or any heavenly body in a state of incandescence or in metals submitted by the chemist to great heat. See SPECTROSCOPY.

Speculum (*spĕk′ū-lŭm*) **Metal** is an alloy composed of 126 parts of copper and a little over 58 of tin, which is used for the mirrors or *specula* of telescopes. It is very brittle, will take a fine polish, and does not tarnish easily. A silvered glass is, however, taking its place, being just as good and less expensive.

Speke (*spēk*), **John Hanning,** an African explorer, was born on May 4, 1827, in Somersetshire, England. At 17 he entered the Indian army, where between his periods of military service he collected specimens in natural history and planned available routes of travel. In 1857 he was sent out with Burton by the Royal Geographical Society to find the great lakes of Central Africa. Speke, when alone, discovered the Victoria Nyanza, and in 1860, while associated with J. A. Grant, he returned and explored its coasts and followed the river until he was satisfied it is the Nile. It was disputed, however, by Burton and other travelers, and Speke made arrangements for a public discussion with Burton at Bath. But on the morning of the day set, Sept. 15, 1864, he accidentally shot himself. His writings are *Journal of the Discovery of the Source of the Nile* and *What Led to the Discovery of the Source of the Nile.*

Spelling. The art of orthography as taught in the elementary school. It formerly was closely associated with reading, but has come to be treated in connection with written composition. This is due to the fact that people do not ordinarily spell, except when they are giving written expression to their thoughts. The ideal selection of words would be from those most commonly used in composition, rather than from reading, which represents, for the child, a much larger vocabulary. The subject, as a separate school-study, usually begins in the second school-year and extends through the elementary school.

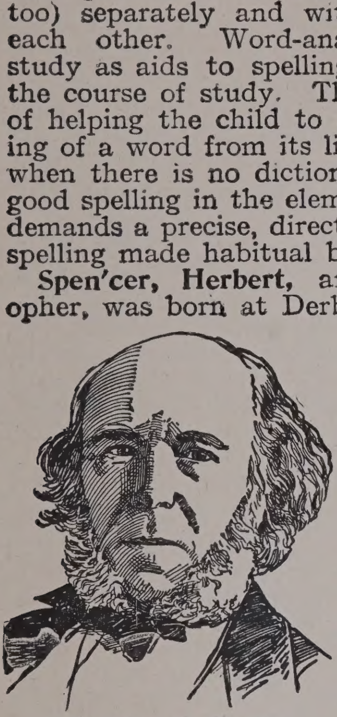
Spelling represents the attempt to associate the actual order of letters which go with a meaning and its spoken symbol. In perfect spelling the child has a fixed association of three elements: The meaning of the word, the pronunciation of the word and the spelling of the word. The presence of any of these factors ought immediately to recall the other two. All should be presented together so as to be recalled together.

(1) There are four general ways of getting the meaning of a word: (a) By experience, through action, observation, conversation etc., (b) by the context of surrounding language, (c) by the teacher telling the child and (d) by the use of the dictionary. (2) The pronunciation may be obtained by three typical methods: (a) By example, whether it be by the chance example of one's fellows or by the model of pronunciation deliberately given by the teacher, (b) by phonetic translation from the printed word, where either the letters (d-ē̇-r-ā-n-g-e-m-ĕ-n-t), syllables (de-range-ment) or phonograms (de-r-ange-m-ent) are changed into sound and combined, and (c) by the use of the dictionary, where the sound of a letter in a familiar word at the bottom of the page is transferred to the word under investigation through the similarity of diacritical marks in both. (3) The correct order of letters is usually found in one of four general ways: (a) By having the child copy the word from a book or from the teacher's spelling, (b) by using the dictionary, which is *very difficult* for the child who does not know the spelling and, therefore, has to guess at its beginning until he finds the word (c), by looking attentively at the word (visualization) and then memorizing it and (d), when the word is very regular and pronunciation will suggest the order of letters, by translating his pronunciation into letters.

In actual teaching there are many ways of presenting the spelling of the word, with its pronunciation and meaning. The teacher will usually (1) revive the meaning carefully, (2) have the child look attentively at the written word (visual impression), (3) have him copy it carefully (motor impression), (4 pronounce it carefully for the child to hear (auditory impression); and (5) then have the child speak it (motor impression).

The spelling must be practiced so as to fix the order of letters in his memory. This may be done (1) by the spelling of single words in written lists, (2) by spelling the single word aloud, pronouncing the same before and after (dog, d-o-g, dog), (3) by spelling the word in a sentence. This spelling of words in sentences may be (a) in copying, (b) by taking down dictation and (c) by writing the words in any composition where the child is trying to express his own thoughts. The last-named method is the best test of ability to spell.

With the usual elementary-school child, below the seventh or eighth grades, it is now preferable to teach homonyms (to, too) separately and without reference to each other. Word-analysis and word-study as aids to spelling are passing from the course of study. They are good ways of helping the child to guess at the spelling of a word from its linguistic derivation when there is no dictionary available, but good spelling in the elementary school now demands a precise, direct and authoritative spelling made habitual by practice.

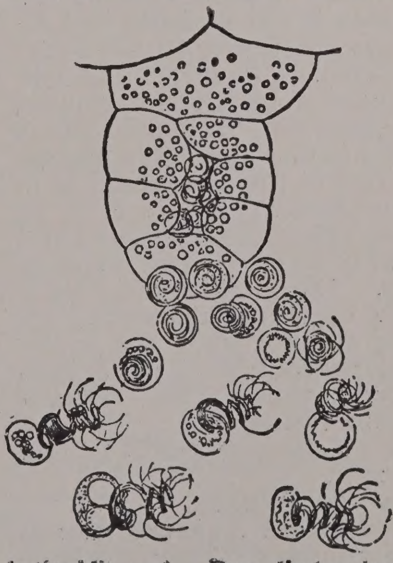


HERBERT SPENCER

Spen'cer, Herbert, an English philosopher, was born at Derby, April 27, 1820. His father was a teacher, and the son inherited a taste for natural science, keeping collections of insects and making drawings of them as a boy. His first work was that of a civil engineer, in which he was engaged for about eight years, publishing articles in *The Civil Engineers' and Architects' Journal*. From 1848 to 1853 he was an editor of *The Economist*. His first important publication was *Social Statics* in 1850. His great plan was the working-out of a system of philosophy based on the doctrine of evolution, the theory that the world is the result of a long series of changes, produced by force acting on matter and resulting in motion. In applying evolution to the study of man in society Spencer employed assistants to collect and arrange all sorts of facts in regard to customs, worship, government etc. of savage tribes, ancient and modern races. His philosophical writings are very numerous, *Principles of Psychology*, *First Principles*, *Principles of Biology*, *Data of Ethics* and volumes of essays being among the best known. His brilliant power of drawing conclusions from a vast array of facts, his great knowledge of science and his wealth of illustration made him popular as well as gave him a high position among philosophers. (See FISKE, JOHN.) His most popular works are a small book on *Education* and *The Study of Sociology*. He died on Dec. 8, 1903.

Spencer, Mass., a Worcester County town, population 5,980, 900 feet above sea level, settled in 1752, is situated on the Boston & Albany railroad, 12 miles west of Worcester. It is the birthplace of Elias Howe, inventor of the sewing machine, and contains the Luther Hill Public Park, David Prouty High School, Richard Sugden Block and Library, gifts of public-spirited citizens. The chief industries are shoe, wire and woolen goods, paper and wooden box factories. Population 7,000.

Spenser, Edmund, an English poet, was born at London about 1552. He studied at Cambridge, obtaining considerable knowledge of Latin and Greek literature, as is seen in his works, and making a friend of Gabriel Harvey. In 1579 appeared his first work, *The Shepherd's Calendar*, the first note of the great Elizabethan poetry. It was dedicated to Sir Philip Sidney (*q.v.*), one of his stanchest friends, whose acquaintance he had made probably through Harvey. Through Leicester, Sidney's uncle, doubtless, he was appointed secretary to the lord-deputy of Ireland, which thus became his home. The country was in rebellion, and Lord Grey suppressed it so cruelly as to be recalled, and Spenser learned the lesson of massacre and extermination, which he afterward advocated, making his name hateful to the Irish nation. His great work, *The Faerie Queene*, was begun in England, but the larger part was written in Ireland. The first three books were published in 1590 and brought great fame and a small pension, but no political preferment, as he had hoped. Two more cantos and two stanzas were published in 1596, leaving the poem unfinished. The first two books are those usually read and give the best idea of the beauty of the poem, which places him in the first rank of English poets. Of his other poems, *Colin Clout's Come Home Again* perhaps is the best known. In 1598, after returning from London to his Irish home at Kilcolman Castle, in an insurrection his home was burned, and he fled with his family to London, which he reached exhausted and destitute. There he died soon after at a tavern in King Street, Jan. 13, 1599. He was buried beside Chaucer in Westminster Abbey. See *Spenser and His Poetry* by Craik and *Spenser* by Church, in the English Men of Letters Series.



Antheridium of a Fern discharging the Coiled Multiciliate Sperms.

Sperm (in plants), the male cell which unites with the egg in the process of fertilization. Antherozoid and spermatozoid are terms applied to the same body. In all groups of plants, except the seed-plants, the sperm is chiefly a ciliated, free-swimming cell. In *Thallophytes* the cilia are variously disposed. In *Bryophytes* each sperm has a pair of cilia at its anterior end. In *Pteridophytes* the body of the sperm is large and spirally coiled, tapering into a long, slender beak which bears numerous long cilia. In *Spermatophytes* ciliated sperms do not occur, except in Cycads and Ginkgo, the male cells being transferred through pollen tubes.

Spermaceti (*spẽr'mȧ-sē'tĭ*) is a waxy substance obtained from the oil found in the head of a sperm-whale. The oil in the head of an ordinary-sized whale will fill 12 barrels. The oil is drained off, and the spermaceti washed with hot water and weak boiling lye. It is a white substance, looking like wax, without taste and with very little odor. It is used for candles and in medicine.

Sper'mary, the male organ of plants, that is the organ which produces the sperms. It is the same as *Antheridium* (*q. v.*), but is substituted for it by those who wish to emphasize the fact that an antheridium holds no relation to the anther of flowering plants.

Spermatophytes (*spẽr'mȧ-tȱ-fīts*), the highest of the four great divisions of the plant-kingdom, characterized by the production of seeds. The name means seed-plants. This great group has received numerous other names, as flowering plants, Anthophytes, Phanerogams, Phænogams, Phenogams, Siphonogams etc. The seed-plants form the most conspicuous vegetation on the earth's surface, and are the plants most usually noticed. They have been evidently derived from *Pteridophytes*, differing from them chiefly in the production of seeds. The condition which has resulted in the formation of a seed is the presence and retention of a single megaspore (embryo-sac) in the megasporangium (ovule). The two great lines of spermatophytes are gymnosperms and angiosperms. In gymnosperms (naked seeds) the ovules and seeds are exposed upon the face of the open scale, as in pines, spruces, cypresses, junipers etc. In angiosperms (inclosed seeds) the ovules and seeds are inclosed in an enveloping carpel or group of carpels. The gymnosperms are a very ancient race, being represented only by about 400 living species; while the angiosperms are modern, containing more than 100,000 described species. See Gymnosperms and Angiosperms.

Spermatozoid (*spẽr'mȧ-tȱ-zō'ĭd*) (in plants). See Sperm.

Sperm-Whale. See Whale.

Sphagnum (*sfgăg'nŭm*). A genus of mosses known as the bog-mosses. They are large and pallid forms, which occur in great masses in boggy regions, especially at the north. The sphagnum-bogs are great peat-formers, and associated with the sphagnums are many strange seed-plants, as carnivorous plants, the rarer orchids, heaths etc. This association of plants of strange habits seems to be due to the fact that the waters of the bog are poor in nitrogen-containing salts, and only those plants which have learned to endure such conditions are found. The genus sphagnum is so peculiar that it forms one of the two great groups of mosses, the other and much larger group being called the true mosses. Sphagnum is an intermediate form, combining characters which belong to liverworts and true mosses. See Musci.

Sphinx, The. The sphinx at Gizeh, the oldest of known statues is a colossus having the head of a man and the body of a lion. It is chiseled from the living rock, 1,800 feet distant from the great pyramid. Some say it was hewn by the Hor-shesu, servants of Horus, before the reign of King Mena of the first dynasty and was in need of repair at the time Khufu built the great pyramid. The sphinx faces east that he may be the first to catch sight of Ra, his father, the rising sun. It was known to the ancient Egyptians as Hu or Seheps, and to the "sons of the desert" it was Abul-Hoe (father of terrors). Binion, in *Ancient Egypt or Mizraim* gives the measurements as follows: Height of head from top of head to bottom of chin 19 ft.; horizontal diameter on level of forehead 23 ft; circumference at level of forehead 72 ft.; horizontal diameter near broadest part of wig 29 ft.; circumference near broadest part of wig 91 ft.; height of neck 5 ft.; horizontal diameter 22 ft.; circumference of neck 69 ft.; total height, present state (Bey) 65 ft.; ear 6 ft. 5 in.; nose 5 ft. 10 in.; the mouth 7 ft. 8 in.; face, widest part across, 13 ft 7 in.; whole length of body 140 ft., outstretched paws 50 ft. The execution of this masterpiece shows the product of a mature people; of a nation that had been in development for generations and generations. Notwithstanding the devastation that has befallen this powerful statue — the lower part of the head-dress fallen; the neck diminished until the massive head seems almost to totter on the verge of downfall; the nose and head broken off by fanatics; and the paws and breast that were restored by the Ptolemies and the Caesars also in a state of decay — it still is rapt in profound thought and tranquility behind which great strength and power seem to live in perfect command. G. Maspero, in speaking of the great sphinx in his *Manual of Egyptian Archæology*, says: "The art which conceived and carved this prodigious statue was a finished art, an art which had attained self-mastery and was sure of its effects."

Other sphinxes are found in Egyptian ruins of a later date during the age of temple-building, and are much smaller and of three kinds; namely, androsphinx, which has the head of a man; criosphinx, the head of a ram; and hieracosphinx, a hawk's; yet all have the body of a lion. These were employed along the avenues leading to temples and along the passages that joined together the sacred fortresses which usually outnumbered the temples in every city and were used as the last resort in an attack from enemies. Consult Maspero's *Manual of Egyptian Archæology;* Binion's *Ancient Egypt or Mizraim;* and Hamlin's *History of Architecture.*

Spice Islands. See MOLUCCAS.

Spices, certain vegetable substances, used for flavoring food. They are the product usually of tropical countries, and are brought mainly from the east, though some are found in the tropical regions of America. They come from different parts of the plant, as ginger from the root, pepper and nutmeg from the fruit, cinnamon from the bark, and cloves from the bud. Ginger, cultivated in the East and West Indies, is prepared for the market by scalding the roots in boiling water or by scraping the roots and then washing. The first process makes white ginger, and the last black ginger. Preserved ginger is the young rootstocks preserved in syrup. Nutmeg and mace are obtained from the fruit of trees or shrubs native to Asia, Madagascar and America. Nutmeg is the kernel or seed of the fruit, which is yellow and looks like a pear that is somewhat round, and has rather hard flesh. Around the nut is a network of fibers called mace, and within the thin brown shell is the nutmeg. The mace is blood-red when fresh, but when dried in the sun turns a light brown. It is sprinkled with sea-water to preserve it and pressed flat. Both mace and nutmegs yield an oil and are used in medicine as well as in food. The trees do not bear fruit until eight or nine years old. Cinnamon is the inner bark of the cinnamon-tree. The tree is a native of Ceylon, and grows also in China and South America. The bark is taken from the tree in strips about 40 inches long, and gathered into bundles, which makes it ferment so that the outside bark is easily peeled off. It is dried, and rolled up. The best cinnamon comes from Ceylon. Cloves (called so because they look like small nails, from *clavus,* the Latin for nail) is the flower-bud of the clove-tree. The tree is a native of the Moluccas, grows about 40 feet high, and lives to be 100 or 200 years old. The spice is the blossom, and is gathered before it is quite open and dried in the shade. The tree does not grow well out of its native soil. The oil of cloves is used in medicine. Pepper is a berry which grows on a climbing shrub. It is about as large as a pea, and there are 20 or 30 in a cluster. They are yellow when ripe, black when dried. Black pepper is made by grinding the whole berry, white pepper by rubbing off the outer covering before grinding. Cayenne pepper is the pod of a plant, and was first brought from Cayenne in South America. Mustard is obtained from the seeds of a plant, three varieties of which are used — the black found in Europe, the white in Europe, Asia and the United States, and a weed, called the wild mustard, found in England and the United States. The seeds of the wild mustard are used only to mix with the others. The flour made from the seeds is often adulterated, but mixing it with wheat-flour is allowed, as it keeps better and is less bitter and stinging.

Spi'ders, a distinct group of animals related to scorpions, daddy-long-legs and mites. United with the latter, they make the class *Arachnida,* which is related to the classes of insecta, crustacea and myriopoda. Their body is separated into two parts, a combined head and thorax and an abdomen. There are four pairs of walking-legs on the thorax, which distinguish them from all insects, the latter having three pairs of legs. The head carries poison-jaws, mouth-parts and, usually six or eight simple eyes. The arrangement of the eyes is an aid in classifying spiders. They breathe by means of air-chambers on the abdomen, which are called lungs. These number two or four, and, when the former, there also are air-tubes in the body. The spinnerets from which the thread is spun are little knob-like processes on the under side of the abdomen near its tip. There are two, three or four pairs with numerous horny tubes opening upon them. The substance of the thread is fluid and hardens on contact with the air. It is formed within numerous glands, one of which opens in each horny tube. Fluid issues from the various tubes and is usually united into a single thread. Some spiders, in place of spinning webs, send into the air a slender thread which becomes longer and longer, and, finally, is sufficient to act as a float. They let go their hold and go sailing through the air often for miles, supported by this floating thread, and ballooning spiders sometimes are seen far out at sea. Spiders lay eggs in silken bags or cocoons, which are sometimes carried about by the female and at other times attached to objects in sheltered places. The young that hatch from the ball dragged by the mother climb up her back, and for a time she thus carries them about. The kinds of spiders and the webs they form are varied. The cobweb of the house-spiders is most familiar, though there is a much larger number of webs to be found out-of-doors. The common garden-spider with its geometrical web is well-known. The large black and yellow spider is frequently seen in the autumn. The interesting jumping-spiders are common on plants, logs, fences and sides of buildings. The common grass-spider makes its web in the form of a funnel in the grass. Some spiders of small size build no webs, but wander about and leap upon their prey like tiny tigers. The trap-door spiders inhabit tubular nests in the ground provided with a trap-door to close the entrance; several species are found in our southern and southwestern states. Some triangular spiders, with sharp spines projecting from their bodies, are among the most curious forms. Among the largest spiders of warm and tropical countries is the tarantula (*q. v.*), a large, hairy, fierce-looking spider whose bite is poisonous but rarely, if ever, fatal to man. All have poison-glands, but very few are harmful to man. There also are crab-spiders (*mygale*), measuring six or seven inches across, which prey upon birds and other small animals. Some of these inhabit our western plains and others are found in tropical regions of the Old World. The king-crab is usually regarded as belonging to the same group as the spiders. See McCook: *American Spiders and Their Spinning Work* and Emerton: *The Common Spiders of the United States.*

Spike, an inflorescence in which the flowers are sessile, or nearly so, and upon an elongated axis. See INFLORESCENCE.

Spike'let, small spikes which form a part of a larger inflorescence, as in grasses. See INFLORESCENCE.

Spikenard (*spīk'närd*) or **Nard,** a perfume obtained from a small plant, a native of India. It was much prized by the ancients and used in baths and at feasts. The odor is not generally liked by modern nations, and it is now used more in medicine than as a perfume. Some other plants of the same order, used in the place of spikenard, grow on the Alps and other mountains of southern Europe, where the peasants gather them from the rocks.

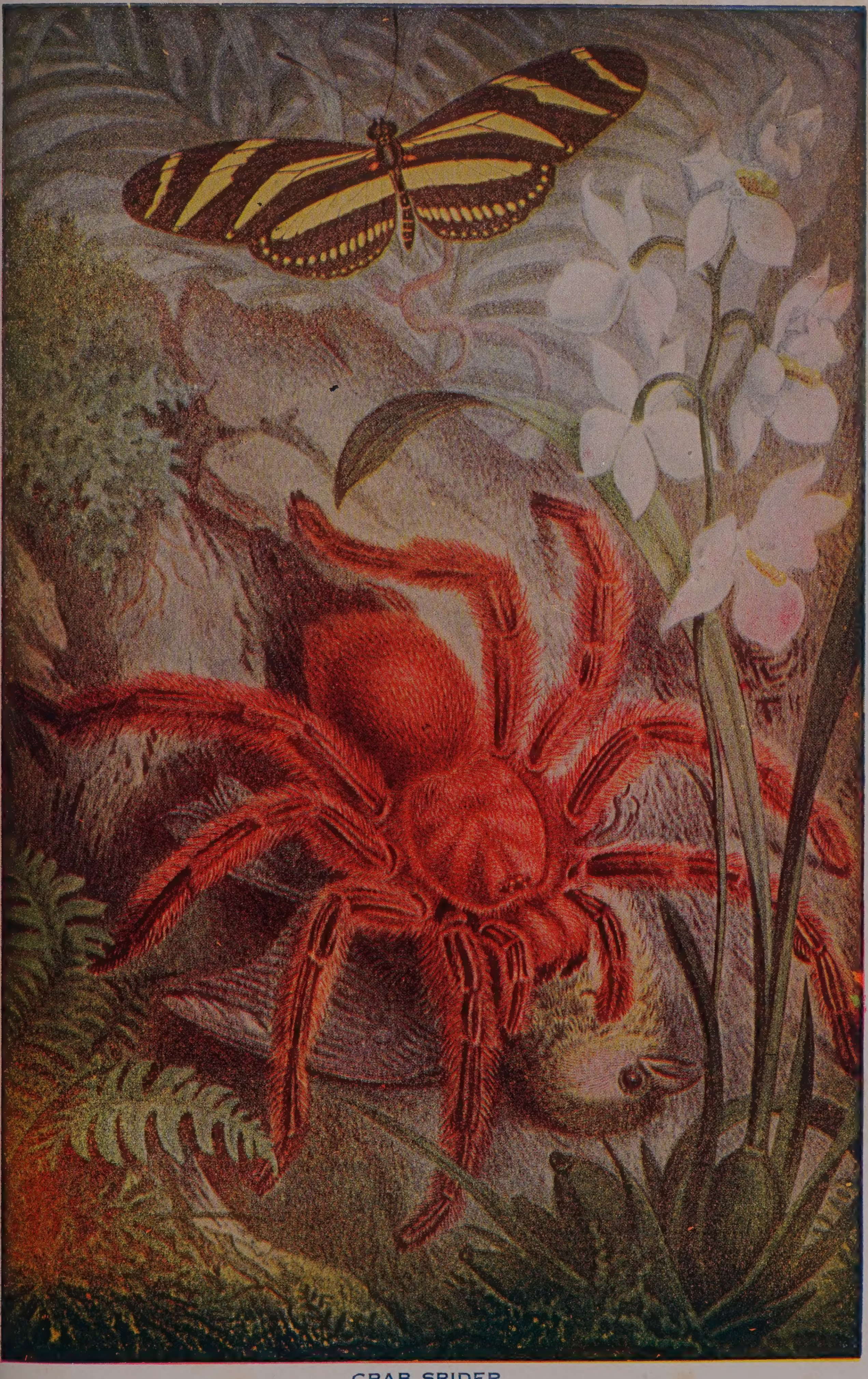
Spine, a rigid, sharp-pointed outgrowth from plants. Ordinary spines are modified branches and sometimes leaves, which have become stunted on account of deficient food-supply. They are most common in plants of arid regions. Sometimes, however, hairs become very rigid and sharp, in which case they are said to be spiny.

Spin'ner, Francis Elias, an American official, was born at Mohawk, N. Y., in 1802. He was in Congress from 1855 to 1861, but is best known as treasurer of the United States for 14 years. In this capacity his signature was placed on all the paper-money of the United States, and the very curious autograph, defying imitation, was known all over the world. He retired in 1875, and died on Dec. 31, 1890.

Spin'ning, an old-time household industry, performed by the hand, by means of the spindle and distaff, but now a process extensively performed by machinery, and consisting of drawing out and twisting into thread wool, cotton, flax, silk and other fibrous substances, suitable for sewing purposes or weaving. The operation was first performed mechanically by the spinning-machine or jenny, invented in England about 1767 by James Hargreaves (*q. v.*), a Lancashire weaver, by the operation of which a number of threads were spun together. To this spinning-jenny was later on invented and attached a bobbin for winding the yarn by a motion separate from that of the spindle. Still later the jenny was followed by the spinning-frame and the spinning-mule, which ultimately superseded the jenny in cotton manufacture. In England Manchester is the chief seat of the spinning and cotton-making industry; while in America there are now not less than 25 million spindles in operation in the great textile factories spread over, chiefly, the eastern portion of the United States.

Spinola (*spē'nō-lä*), **Ambro'sio,** Marquis of, a great Italian soldier, was born at Genoa in 1571. With his brother he raised a force of 9,000 men whom he kept at his own expense. He served first in the Netherlands. His reduction of Ostend, which had been besieged two years, gave him a great reputation, and he was placed at the head of the Spanish and Italian troops in the Netherlands. His great antagonist was Prince Maurice of Nassau, and in their long struggle neither could gain any advantage. After an armistice of 12 years, beginning in 1609, with the renewal of the war Spinola was once more opposed to Maurice, who died, however, before the walls of Breda. The taking of Breda in May, 1625, after a siege of ten months, was Spinola's last victory. He had spent his fortune in maintaining his troops, but his claims were not acknowledged by the Spanish government, and vexation from this shameful neglect is said to have hastened his death, which took place in Piedmont, Sept. 25, 1630.

Spinoza (*spĭ-nō'zä*), **Ben'edict,** the great Dutch-Jewish philosopher, was born at Amsterdam, Nov. 24, 1632, of Hebrew parentage. His philosophical studies gradually drew him away from the faith of Israel, and he was formally excommunicated in 1656, when he changed his name, which was Baruch, to Benedict. In common with all Jewish youth he had been taught a trade, in his case that of polishing lenses, by which he now supported himself. At the death of his parents he contested with his sisters his right to the inheritance, but, when he had obtained it, took only one bed. He moved to Leyden and then to The Hague, where he was offered a professorship at Heidelberg, Germany, if he would teach nothing opposed to the received religion. He declined the position, the offer of money by a wealthy friend and a pension, conditioned on dedicating



CRAB SPIDER

one of his works to Louis XIV. Yet he was living on only a few cents a day. Separated from his friends, suffering from ill-health and want and harassed by continual persecution, he continued his life of study until his death on Feb. 21, 1677. His philosophical system was based on that of Descartes, and is mainly contained in his *Ethics*, which was not published until after his death. "The world has produced no intellect more profound than that of Spinoza, and Spinoza has produced no book which can be compared with his *Ethics*," which attracted the admiration of such men as Goethe, Fichte, Schelling and Hegel and gave character to a school of philosophy. During his life Spinoza published only two works: *Abridgement of the Meditation of Descartes* and a *Treatise on Theological Politics*. Consult H. Smith's *Spinoza and His Environment* and the *Life* by Pollock.

Spi′rea, a genus of plants of the rose family. The species scattered throughout the temperate parts of the northern hemisphere consist of small, unarmed shrubs or perennial herbs, with racemes or corymbs of white or reddish flowers. North American, Indian and Japanese shrubby species are in cultivation. Two very fragrant British species are known by the name of meadow-sweet. Dropwort, found in Sweden, has tuberous roots which are somewhat nutritious and are ground and made into bread. Hardtack, a species in the United States, is used as a tonic and astringent.

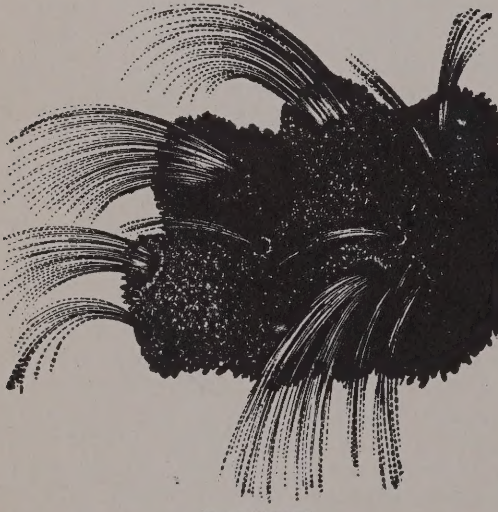
Spirogyra (*spī′rō-jī′rȧ*), a genus of plants belonging to the green algæ, which has received its name from the fact that the very conspicuous chloroplast passes as a broad spiral band from one end of the cell to the other. The species are filamentous forms, and are very common in frothy masses in stagnant fresh water and about springs, being commonly known as pond-scums or frog-spittle. Spirogyra belongs to the conjugate forms, its filaments becoming connected in pairs by outgrowing tubes at the time of fertilization. See CHLOROPHYCEÆ.

Spitzbergen (*spĭts-bĕrg′en*), a group of islands in the Arctic Ocean, 400 miles north of Norway. They are covered with ice, with sharp projecting peaks, which give them their name of Spitzbergen, meaning Needle-like Mountains. On the western coast the climate is affected by the Gulf Stream, while the eastern coast is icebound and difficult of access. There is a scanty vegetation, with 40 species of plants; herds of reindeer, the arctic fox and the polar bear are found, with great swarms of sea-fowl. The longest day is four months, and the long night lasts from Oct. 22 to Feb. 22, in which the moon and stars and occasionally the *aurora borealis* are the only light. There are no permanent inhabitants, but the islands are visited by Norwegian walrus-hunters and scientific explorers. Consult Lord Dufferin's *Letters from High Latitudes*.

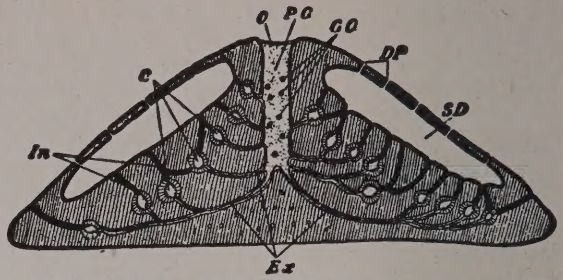
Spof′ford, Ainsworth Rand, a librarian of the United States Congress, was born at Gilmanton, N. H., Sept. 12, 1825, and educated by private tutors. Early in his career he settled at Cincinnati, O., as a bookseller and publisher, and also became associate-editor of the Cincinnati *Daily Commercial*. In 1861 he became assistant to the librarian of Congress, and four years later was appointed librarian-in-chief. In 1897 he was succeeded by J. R. Young and later by Herbert Putnam. Mr. Spofford was an indefatigable compiler of the catalogues of the Congressional library, and for some years issued the *American Almanac*. He also interested himself in copyright matters, published a *Manual of Parliamentary Rules*, and edited the *Library of Choice Literature*, the *Library of Historic Characters and Famous Events* and the *Library of Wit and Humor*. He was one of the greatest librarians that ever lived and a marvel of learning and memory. He died on Aug. 11, 1908.

Spofford, Harriet Elizabeth (Prescott), an American author, was born at Calais, Me., April 3, 1835. *In a Cellar*, one of her first contributions to the *Atlantic Monthly*, attracted great attention. She has since published *The Amber Gods; Sir Rohan's Ghost; New England Legends; Azarian, an Episode;* and still is a frequent and popular contributor to the periodicals.

Spokane (*spō-kăn′*), **Wash.**, formerly called Spokane Falls, a city in the eastern part of the state, is the county-seat of Spokane County and is reached by the Northern Pacific, Great Northern, Oregon Railway and Navigation Company and Spokane and Northern and other railways. Spokane River, which runs through the city, is spanned by 23 bridges, and in a series of falls has a descent of 142 feet, affording splendid water-power. Hydro-electrical development, by no means fully attained, generates 400,000 horse-power. This is utilized in numerous manufacturing plants and in generating electric power, which not only serves the city but is furnished to mines in Idaho, 100 miles distant. The famous silver-lead mines of Cœur d'Alene, Idaho, which produce over one fifth of the annual lead output of the world, are thus operated. This water-power lights the city, operates the mills, 98 miles of street-railways and 258 miles of interurban lines. Spokane is the mining-center of a wide region, and does a large business in handling the products of the mines and in furnishing miners' supplies. It is surrounded by heavy pine-forests, which produce a large output of lumber and make the city an important lumber-market. It also is the chief market for the extensive grain-products of eastern Washington. The adjacent country is also rich in farm and dairy products, fruit and live stock, and has valuable quarries of granite. The manufacturing interests include lumber and lumber-products, machine-shops, foundries, flour-mills, cigars, crackers, soap, flour-mills, machinery-works, pottery, mattress, furniture, broom and trunk factories, a cereal-food plant and brick and terra-cotta works. Spokane is a substantial and admirably built city, as regards both residences and business blocks. Some of the notable buildings are the city-hall, Carnegie Library, the county court-house, St. Luke's Hospital, Masonic Temple, August Paulsen Building, Marshall-Wells Building and Columbia Building. There are more than 70 churches, and the educational facilities are of the best. The 23 brick and stone school-buildings cost over $1,500,000, and the high school $175,000. It is the seat of Gonzaga College (which cost $500,000), Academy of the Holy Name, Brunot Hall for Girls and St. John's School for Boys. Spokane has all the facilities of a thriving modern city, owns its own water-works, and has good drives and parks. The first settlement was made in 1872, the city incorporated in 1881, and now has a population of 150,000, including suburbs.



SPONGES



Vertical section of a fresh-water sponge(*spongilla*), showing the arrangement of the canal system. C. ciliated chambers; DP. dermal pores; Ex. excurrent canals; GO. openings of the excurrent canals; PG. paragastric cavity; SD. subdermal cavities; O. osculum.

Spon′ges, a group of animals intermediate between the protozoa (which see) and animals like the hydra and jelly-fishes (cœlenterata). The sponges were formerly regarded as plants, but that was in the days when superficial appearances only were considered. They are distinctly animals, and are usually separated into a distinct sub-kingdom called porifera. Although they have no distinct organs, they are clearly a step above the simplest animals. They are many-celled animals and are composed of two distinct layers. The middle layer (mesoderm) is foreshadowed in them, but is not distinctly developed. All animals above them have three distinct cell-layers. Sponges are mostly marine, but a single genus (*spongilla*) of fresh-water sponges is widely distributed, being abundant in the region about Chicago, as well as in other parts of the United States. These fresh-water sponges are not often noticed by the casual observer. They are clusters of soft, greenish substance looking like algæ. They will, however, shrink when touched, and, if closely watched, a current of water can be seen coming from a crater-like opening in their top. Minute points of lime are formed within their substance to serve as a support. They increase by budding and by eggs that are formed in the autumn, and carry the life over to another season. The marine sponges are varied in form, size and complexity. Their skeletons are either limy, flinty or horny. The bath-sponges and slate sponges represent the horny skeletons only. When they are living, the skeleton is covered with sponge-flesh, and they look on the outside something like a piece of liver, or like a piece of tanned kid, but always with some pores opening into them. The limy sponges and the glass-sponges are too hard for commercial use. The sponges are all permeated by branching canals which open by small pores on the surface. These canals lead into larger ones, and, finally, open into chimney-like passages which open outward by an orifice of considerable size. Water carrying oxygen and minute food-particles is continually passing in through the small surface-pores, traversing the system of canals, and passing out through the crater-like opening. Along the passage-way are rounded chambers which are lined by numerous cells provided with flagella. These cells do the feeding. The flagella are hair-like threads of protoplasm that keep waving and help to produce the currents of water. The simplest sponges are small tubes with many inlets and a single outlet. The more complex sponges have the passage-ways very much branched and usually several outlets. Sponges increase by budding and also by the formation of eggs. The sponges of the Gulf of Mexico, the

Bahama Islands and the West Indies are of a rather coarse quality. The finest sponges come from the Mediterranean and the Red Sea. Sponges of good quality are found in Florida waters, the best variety, sheeps-wool, selling for $2 to $5 per pound. Sponge-fishing has there become an important industry, employing nearly 200 small vessels, with crews numbering more than 2,500 persons. When a vessel reaches the grounds, the men go out in pairs in row-boats, one man leaning over and scanning the sea-bottom with a water-glass. When a sponge is seen, it is secured with a kind of steel fork on a long, slender pole. The flesh is removed, sometimes by imbedding in the sand, and the skeleton is left. They are then soaked in water, and afterward squeezed and dried in the air. See Hyatt's *Commercial and Other Sponges.*

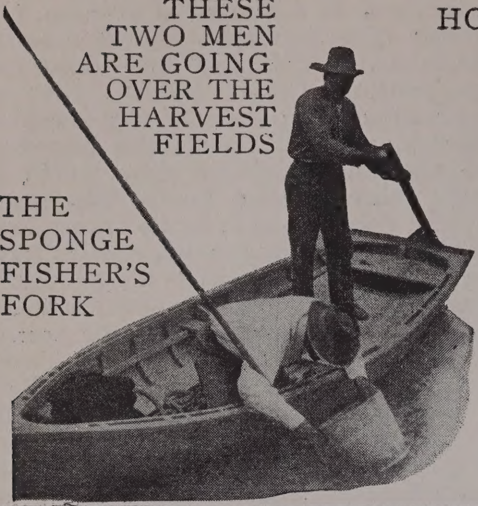
Sponta'neous Combus'tion, or burning without the application of fire, sometimes occurs in mineral and other substances. Charcoal, if saturated with oil, may become so heated as to burn, and coals containing iron pyrites, when wet, will catch fire. Phosphorus, when dry, ignites easily, and has been known to melt and burn in a room where the temperature was only 70°, so that in hot weather a fire may be started by large packages of matches. Hay, cotton, tow, flax, rags, straw, leaves, if collected in large quantities, when damp undergo fermentation, which gives off sometimes enough heat to burn. The cotton-rags and waste used in wiping oiled machinery and lamps have probably started many unexplained fires. Spontaneous combustion of the human body has been thought to occur in a number of cases, usually where the individual was an habitual drinker, but is now considered doubtful. Liebig says a dead body filled with alcohol may burn of itself, but not a living one, in which the blood is circulating. See *Letters on Chemistry* by Liebig.

Spontaneous Genera'tion of Life, the doctrine that life in some form is developed from non-living matter. The ancients believed that frogs and eels sprang from mud, that insects were generated in dew, that decaying meat bred maggots, that the appearance of other forms of life was to be accounted for by spontaneous generation from lifeless matter. This belief was quite general until the 17th century, when the Italian, Francesco Redi, made experiments to test the truth of it. He placed bits of meat in open jars, and others in jars that were covered by fine gauze, and watched for the development of maggots. The blow-flies visited the uncovered meat, but were prevented from reaching the other. Of course, maggots hatched from the eggs, but did not appear in the protected meat, and, by this simple experiment, he proved that maggots did not arise spontaneously from the meat. This was about 1660. He made further experiments and reached the conclusion, not as a matter of opinion, but as a result of experiment, that life arises only from antecedent life and does not develop spontaneously.

This position was quite generally accepted for larger animals, but with the introduction of the microscope, a new world of extremely minute living beings was made known, and doubts began to be entertained that those minute beings must always have parents like themselves. It is a well-known fact that fluids, like clear mutton-broth or water, in which any vegetable or animal substance has been soaked, will, if allowed to stand, soon become teeming with microscopic life. The possibility of this life arising by spontaneous generation formed a new phase of the question. Needham and Buffon attempted to put the matter to test by boiling infusions, to kill all germs that might exist in them, and corking them tightly. In course of time these fluids became cloudy and were overrun with microscopic life. But about 1775 a priest of the period named Spallanzani, showed that their experiments had not been conducted with sufficient care. He boiled infusions for three quarters of an hour in flasks, and, while the fluid was still boiling, heated the necks of the flasks and, drawing them into a fine point, he closed them by heat. No microscopic life appeared in the flask treated in this way, and the conclusion was drawn that spontaneous generation of life was disproved.

About this time oxygen was discovered and shown to be necessary to all forms of life. This brought a new point of view, and objection was made to Spallanzani's form of experiments on the score that oxygen was excluded by sealing the necks of the flasks. In order to test this objection, Schulze and Schwann in 1836 took up the question again and devised a means of admitting oxygen into the flasks containing fluids that had been boiled. The necks of the flasks were drawn out long, and convoluted, and left open at the ends. In some cases the inlet was heated and air drawn in. In other cases the air was passed through bulbs containing chemicals that did not alter the oxygen. It was soon discovered that a plug of cotton-wool in the necks of the flasks would act as a filter. It permits the air to pass through and arrests all floating particles and, therefore, does not allow dust or germs to pass through with the air. A flask, or test-tube, is partly filled with an organic infusion; the latter is boiled and, while boiling, a plug of cotton-wool is pushed into the mouth of the vessel. On cooling, the air passes through this plug, but the smallest solid particles are caught in the meshes of the cotton-wool. Organic fluids treated

FARMING UNDER THE SEA



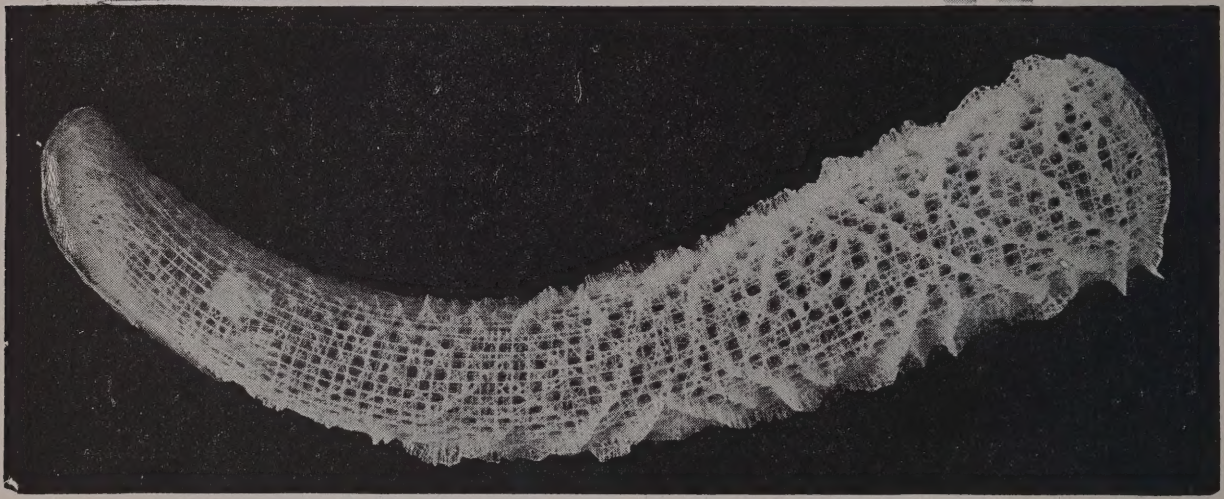
THESE TWO MEN ARE GOING OVER THE HARVEST FIELDS

THE SPONGE FISHER'S FORK

HOW THE SPONGE CROP IS HARVESTED

When the vessel reaches the grounds, the men go out in pairs in row boats, one man leaning over and scanning the sea bottom with a water glass. When a sponge is seen, it is secured with a kind of steel fork on a long slender pole.

THE SPONGE FARMER

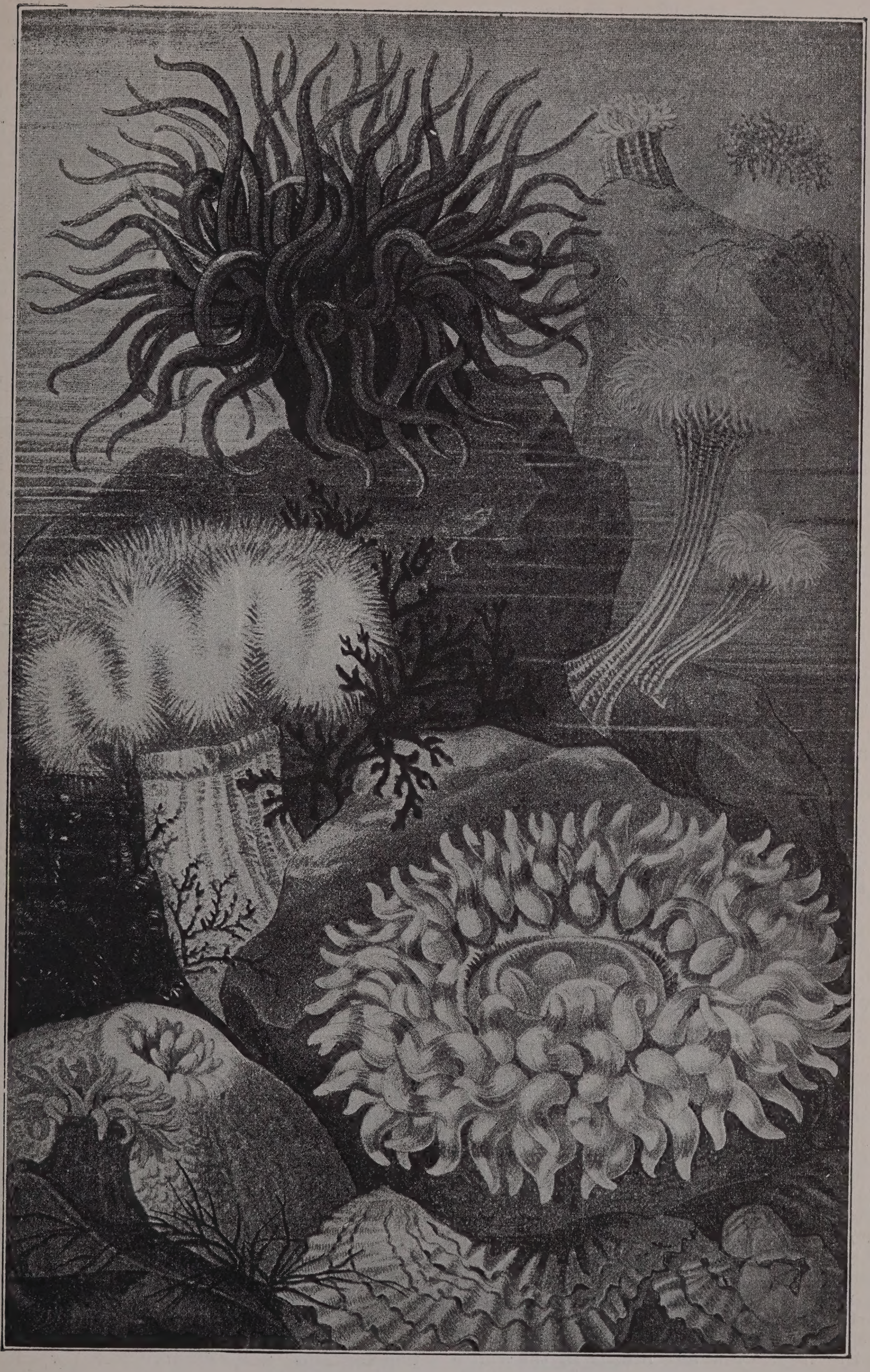


DO YOU WONDER IT WAS MISTAKEN FOR SPUN GLASS?

"One kind of sponge looks like a beautiful vase of spun glass. When first brought to Europe they were not thought to be sponges at all, but vases made by very skillful workers in glass."

FROM SEA BOTTOM TO THE MARKET

Below, on the left, a Greek sponge gatherer is going down in a diving suit off the Florida coast. After being gathered, sponges are put into those wicker pens where the tide washes them, but cannot wash them away. Below, to the right, is a sponge market where the sponges are graded and offered for sale.

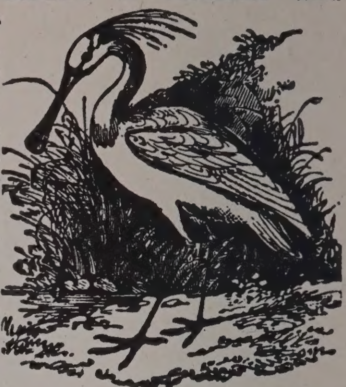


A GROUP OF SEA ANEMONES

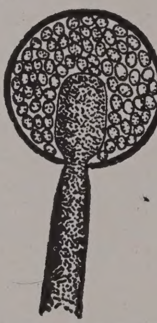
in this way have been known for years to show no sign of microscopic life.

The question was regarded as settled, but in 1859 it was unexpectedly opened in Paris by Pouchet, who claimed that life was developed in organic fluids even after boiling and preventing the entrance of floating particles from the air. Pasteur, however, demonstrated that Pouchet had been careless, and had admitted solid particles to the flask in the mercury, through which the oxygen had been introduced into the flasks. This closed the question as far as it could be answered by experiment. Professor John Tyndall added something to the certainty of the matter by an ingenious experiment. He had an air-tight box made with glass-windows, through which he passed a strong beam of light in a darkened room. The floating particles in the air, contained within the box, fell of their own weight, and came to rest on the sides and bottom of the box, which had been smeared with a sticky substance to hold them. He could tell when the air was completely cleared of these particles by his beam of strong light, because any minute floating particle would become illuminated and reflect the light. When they had entirely come to rest, he called the air "optically pure." Through the bottom of this box he had inserted a number of test-tubes with their mouths opening into the chamber, and, by means of a long funnel and a hole pricked in a rubber membrane at the top, he was able to introduce a variety of organic fluids into these test-tubes. The ends of the test-tubes outside of the box were now inserted into boiling oil and all germs of life that might be contained in the fluids were completely killed. He was able to expose the fluids in these open test-tubes to the optically pure air for months, without any appearance of microscopic life in any of them. To demonstrate that the fluids were capable of supporting such life, he had simply to open for a moment an air-tight door in the back of the chamber and admit some of the outside air. When this was done, the fluids became turbid in a short time, and were teeming with microscopic life. Thus it was demonstrated that microscopic life came from floating germs in the air, and is not spontaneously generated in organic fluids. See Tyndall in *Pop. Sci. Mo* (vol. 12, 1878) and in *Floating Matter of the Air*. WILLIAM A. LOCY.

Spoon'bill, the name of birds related to the Ibises, having long, broadly expanded bills, more like paddles than spoons. They belong chiefly to the eastern hemisphere, where there are six or seven species. The European spoonbill is a white bird about 32 inches long. It breeds in Holland and other parts of Europe. The roseate spoonbill is the only American species. It is abundant in the tropics and also breeds in the southern United States. These birds inhabit marshes, muddy borders of estuaries and small sea-islands overgrown with bushes. They are from 28 to 35 inches in length, of a beautiful rose-color, deepest on the wings, fading to almost white on the neck, back and breast. Their tail-coverts are deep carmine. They feed at night by gathering insects and shell-fishes from the mud in shallow water. In the breeding season they congregate in large numbers.


WHITE SPOONBILL

Sporangium (*spô-răn'jĭ-ŭm*), an organ of plants which produces asexual spores. In the thallophytes a sporangium is usually a single cell; but in the higher plants it is a many-celled organ. The sporangia of ferns and the pollen-sacs of seed-plants are illustrations of many-celled sporangia. In heterosporous plants sporangia become differentiated, the microsporangia producing microspores, and the megasporangia producing megaspores. In seed-plants the pollen-sacs are microsporangia, and the ovules are megasporangia.


SPORANGIUM OF A MOULD

Spore, a plant-cell specially set apart for reproduction. Spores have received the greatest variety of names in different groups of plants, but they may all be reduced to two great groups. Asexual spores are those which are formed by the division of a cell, or at least are not formed by the union of cells: while sexual spores are those which are formed by the union of two sexual cells, called gametes. These two types of spores do not differ from one another in power, but in mode of origin. The sexual spore has received the general name of oöspore; but in plants in which the pairing gametes are similar it is more frequently called a zygospore or zygote. The asexual spores have received very many names. Among the green algæ the characteristic asexual spore is a ciliated, free-swimming cell, and is called a zoöspore or swarm-spore. Among fungi, asexual spores have received such names as conidia, ascospores, uredospores, teleutospores, æcidiospores, basidiospores etc. Among bryophytes and pteridophytes they are known simply as spores. When heterospory is introduced, they become microspores and megaspores; and in spermatophytes they are known as pollen-grains and embryo-sacs. Such a multiplicity of names for the same body is very confusing at first, but when the terms are learned they are very convenient in designating either the group or method of origin of the spore referred to.

Sporogonium (*spō-rô-gō'nĭ-ŭm*) (in plants), the leafless sporophyte of mosses, as distinguished from the leafy sporophyte of ferns and seed-plants. When highly organized, it consists of foot, seta and capsule; and its sole function is the production of spores. See Musci.

Sporophore (*spō'rô-fōr*) (in plants), a special branch which bears spores. Used chiefly among the fungi, where special spore-bearing branches arise from the mycelium. See Fungi.

Sporophyte (*spō'rô-fīt*). In alternation of generations (which see) among plants the generation which bears the asexual spores is the sporophyte, as distinguished from the generation which bears the sex-organs and produces the sexual spore, called the gametophyte. In the mosses the sporophyte is the leafless sporogonium (which see), consisting chiefly of a spore-case (capsule) on a stalk. In the ferns and seed-plants the sporophyte becomes the conspicuous leafy part of the plant, in fact the whole plant of ordinary observation. It is of interest to note that the sporophyte is essentially sexless, and that to speak of "flowers," structures produced by the sporophyte, as having sex-organs, is very far from the fact.

Spottsylva'nia Court House, a small village in Virginia, 55 miles northwest of Richmond. It is known as the scene of one of the desperate battles of the Civil War, fought between Lee and Grant, May 10, 1864. When Grant was driven back, with terrible slaughter, he wrote to the secretary of war the famous message: "I propose to fight it out on this line, if it takes all summer." On the 12th the attack was renewed, and the next day Lee, suffering from heavy losses, withdrew to an inner line of intrenchments, from which Grant could not drive him but moved around him on his way to Richmond.

Spray'ing-Mixtures are intended to be applied in liquid form by means of spraying-machines to trees, small fruits, vines, flowers and vegetables to prevent the ravages of fungous diseases and insects. Fungicides and insecticides may, in many cases, be applied dry as well as in solution, as the Bordeaux mixture, Paris green etc. Fungicides much used are the popular Bordeaux mixture (*q. v.*) and ammoniacal solution of copper-carbonate. The latter contains copper-carbonate, five ounces, made into a paste by adding one and a half pints of water, aqua ammonia of 26 degrees strength and 45 gallons of water. This preparation is clear, and is not so easily noticeable on the plants as are the preparations containing lime. Insecticides for spraying are of two sorts, depending upon the general division of injurious insects into the classes of biting-insects and sucking-insects. Biting-insects, those with jaws for chewing foliage, fruit etc., will also eat the poison on their food; hence the arsenical poisons are most generally used for this class of insects, examples of which are grasshoppers, potato-beetles and other beetles. Sucking-insects have bills that penetrate the plant-tissues, as of the stem, and so are not affected by poisons on the surface. Examples are plant-lice, scale-insects and squash-bugs. They mostly have soft bodies and are fought with soap-kerosene emulsions, designed to coat their bodies and suffocate the insects by excluding the air from the breathing-pores scattered over their skin; for these animals do not breathe through an opening in the head. The lime-sulphur wash is widely used for scale-insects in orchards. The larva or caterpillar stage of flies, beetles, moths and butterflies have both soft bodies and jaws for chewing, and so can be fought by either kind of antidote. The best known of the first class of insecticides are Paris green, London purple and white hellebore. Paris green is composed of copper oxide, acetic acid and white arsenic (arsenious oxide), and should contain at least 50% of the last-named ingredient. Paris green should be mixed with quick-lime to render insoluble any free arsenic, which is poisonous to plants, at the rate of one pound of each to each 100 or 300 gallons of water. The mixture should be strained, and constantly stirred while using. London purple is less reliable, on account of the larger amount of soluble arsenic and the variability of its composition. The lime-sulphur wash is composed of unslaked lime 20 pounds, flowers of sulphur 15 pounds and water to make up from 45 to 50 gallons.

The concentrated stock-solution of kerosene-emulsion is composed of hard soap in fine shavings or even of soft soap one half pound, rain-water one gallon, kerosene (sometimes called coal-oil) two gallons. The soap-solution is brought to a boil, poured into the kerosene, and churned vigorously. Dilute for use with 10 to 20 volumes of water. A diluted decoction of tobacco-stems is good for spraying house-plants and garden-vegetables. While not exactly a spraying solution, carbon bisulphid is much used for pests living around the roots of garden-truck. It is a highly inflammable liquid with a very disagreeable odor, and, when poured down a small hole near the base of the plant, it drives away cut-worms and similar pests. Consult Lodeman's *Spraying of Plants*, Weed's *Insects and Insecticides*, and bulletins of the state experiment-stations and of the U. S. Dept. of Agriculture.

Spring'bok, a species of antelope found most abundantly in Africa. It is a beautiful creature, larger than the roebuck, brown above and white underneath. The head is white, except a broad band of brown on each side of the eye to the mouth and a brown spot in the middle of the face. Its name comes from the great leaps it makes, springing into the air from seven to 12 feet. It lives on sandy plains, but great herds will travel to more fertile regions. A traveler describes a vast herd seen by him, pouring through an opening in the hills, a living mass half a mile in breadth and taking hours for the passage. It is growing scarce, though still abundant near Zambezi River.

Spring'field, Ills., the capital, is in Sangamon County, a short distance southwest of the center of the state; and, according to the latest census, had a population of 75,000. The first settlement was in 1818, and in 1821 the town was made the county-seat. In 1837 the capital was removed to this place, and a state-house erected. The present capitol, begun in 1868, first occupied in an unfinished condition in 1876 and completed in 1885, cost $5,000,000. The surrounding country is a rich agricultural region, the chief products being corn, oats, wheat, hay, fruits and vegetables. Cattle, hogs and horses are raised extensively. Bituminous coal is mined in large quantities around the city, and is one of the leading products. During a single year more than 2,519,511 tons of coal are mined in the county, and four-fifths of this amount shipped by rail to other parts of the country. The principal articles manufactured here are iron, steel, steam-engines, boilers, agricultural implements, brick, watches and woolen goods. It is a railroad center, main lines of the Wabash, Alton, Illinois Central, Baltimore and Ohio Southwestern, and other roads passing through it, besides a number of interurban electric lines.

The city has a very efficient public-school system. There are 15 buildings, one for high-school purposes with a capacity for 800 pupils, and 14 other buildings for primary and grammar schools. The school enrollment has reached 7,500. Besides, there are colleges and many private schools. Springfield is of historical interest on account of having been the home of Abraham Lincoln. The house in which he resided, when elected president, still stands; and in beautiful Oak Ridge Cemetery just outside the city, is a fine monument erected to his memory, where his remains are deposited. The state-fair grounds and buildings, the most extensive in the country, the encampment-grounds and the armory are here.

Springfield, Mass., a city on Connecticut River, 25 miles north of Hartford. It is a well-built city, parts of it elevated, with a fine park. It is noted for its excellent public school system and fine churches, including a cathedral. The United States armory, employing 3,000 men during the Civil War and from 500 to 700 ordinarily, and the arsenal, in which 500,000 stand of arms can be stored, are located here. Springfield's manufactures are numerous, including the Smith and Wesson arms-factory, the Indian Motorcycle Co., Wason Car Co., Barney and Berry Skate Works and gold chain, goldleaf, filter, envelope, hardware, spectacle, thimble, needles, buttons, kindergarten supplies and candy factories. Springfield was settled in 1635 by emigrants from Roxbury and was called Agawam, from the Indian name of a neighboring river. The city was burnt in 1675 during King Philip's war. It is served by six railroads, including branch lines, and splendid civic spirit prevails. Population, 150,000.

Springfield, Mo., a city in southwestern Missouri. It is built on a table-land 1,500 feet higher than St. Louis, and has an important trade. There are flouring-mills and wagon-factories. Drury College was founded here in 1873. Springfield was a trading-post in 1820, and incorporated in 1830; it has two great railroad-plants, one for the Kansas City and Memphis, and one for the St. Louis and San Francisco system. During the Civil War it was held by Federal and by Confederate forces in succession, and the battle of Wilson's Creek was fought near the city, Aug. 10, 1861. Population 45,000.

Springfield, O., a city in the western part of the state, on Mad River, 80 miles northeast of Cincinnati. It is in a fine farming region, and has a large trade in farm-products. With good water-power, manufactories are numerous, especially those of bicycles, piano-plates, iron fencing, steam-engines, road-rollers and farm machinery, including large numbers of mowers and reapers Wittenberg College, opened in 1845 by the Lutheran church, and Springfield Seminary are institutions of higher learning. Located in this city are the state fraternal homes of three orders: Masons, Odd Fellows and Knights of Pythias. Population 75,000.

Springs are the outflow of underground streams. In general they are due to the accumulation of water which has sunk into the ground, until its course has been closed by a layer of impervious rock. In such cases the water must find some outlet. Such an outlet may often occur in a valley or upon a hillside It occurs in a valley wherever such a valley dips into the ground-water; and on a hillside wherever the percolating water runs along the slope of a bed of rock or clay to the outcrop of the bed. Springs frequently become charged with minerals which have been dissolved in the course of the percolation of the water. The water of hot springs and geysers generally rises from a great depth, whither it has penetrated through a cleft in the start to the warmer zone below. Artesian wells merely are deepened, artificially assisted springs. Springs that rise from a great depth are generally permanent; but many springs are intermittent; others quite variable. The largest springs may indicate the exit of considerable subterranean rivers.

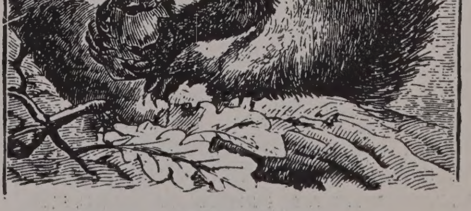
Spur'geon, Charles Haddon, a celebrated English preacher, was born in Essex, June 19, 1834. He never received a collegiate education, beginning his great work by making religious addresses. In 1850, while living at Cambridge, he entered the Baptist church, preaching his first sermon in a cottage four miles from Cambridge. When only 18 he had charge of a Baptist church at Waterbeach, and the small congregation soon doubled. He went to London in 1854, his church there being twice enlarged to accommodate the crowds that flocked to his preaching, until, in 1861, the great Tabernacle, seating 6,000, was built. At one service in Crystal Palace he preached to 24,000 people. His sermons were issued in weekly numbers and translated into many languages. Besides preaching, he conducted a training-school for ministers, an orphanage and an almshouse, and built 36 churches in London. His publications reached nearly 100 volumes, including several volumes of sermons. He preached without writing his sermons, which were taken down in shorthand as they were delivered, and carefully revised by himself. The weekly circulation averaged 30,000, but that of particular sermons was much larger. He died at Mentone, France, Jan. 31, 1892. See *Life* by Spindler, Dyer etc.

Spy, one employed in war to collect information of the enemy. Spies are always used in regular warfare, and no disgrace attaches to the officers employing them. The dishonor which seems to belong to the person acting as a spy comes probably from the fact that the greater number of spies have been traitors to their country, offering their services freely to the enemy. When a soldier volunteers to penetrate the enemy's lines in disguise, to help his own country and army, it is a brave and honorable act and is so recognized, though the laws of war mete out the same ignominious death to all classes of spies. Major André and Nathan Hale, though hanged, are honored for their devotion and self-sacrifice. The risks of the undertaking have made it attractive to those loving adventure, and many thrilling stories are based upon them, notably Cooper's *Spy*. Political spies are those employed by governments to detect conspiracies. They were used in England in the days of the Tudors and, lately, in Ireland. Bismarck was believed to employ them to a large extent, and Napoleon III had a regularly organized system. Russia has the most perfect arrangements for using spies, both at home and abroad, of any modern nation. See *Secret Service under Pitt* by Fitzpatrick and *The Two Spies* by Lossing.

Squid, an elongated cuttlefish extensively used as a bait by cod-fishers. They are found in nearly all seas and are very abundant on the New England coast. They swim in large schools, following young mackerel and herring, upon which they feed. They in turn are eaten by larger fishes. The common squid ranges in size from six to 18 inches, or even longer. They swim backward by throwing jets of water through the siphon. They have ten long arms provided with suckers, being in this regard similar to other members of the group (cephalopoda). Giant squids, of a different genus, have been taken, measuring 52 feet long, counting the arms. One is reported whose body alone measured 23 feet. See CUTTLEFISH.

Squier (*skwīr*), **Ephraim George,** an American antiquarian author, was born at Bethlehem, N. Y., June 17, 1821. He was for several years an editor, but, becoming interested in the antiquities of the Scioto valley in Ohio, began to make a study of such remains, traveling through the Mississippi valley and New York. He published the results of his work in 1848 in the *Smithsonian Contributions to Knowledge* While *chargé d'affaires* in Guatemala, he made further explorations there, receiving a gold medal from the French Geographical Society for his work. He continued his researches while surveying a railroad-route in Honduras in 1853 and while United States commissioner to Peru in 1863. Among his works are *Nicaragua: Its People, Scenery and Ancient Monuments; Notes on Central America;* and *Peru: Explorations in the Land of the Incas.* He died at Brooklyn, N. Y., April 17, 1888.

Squir'rel, the name for any one of a group of small rodents or gnawing animals. They are found in all parts of the world, except Australia. They are abundant in North


SQUIRREL

America, but are poorly represented in South America and in Europe. There are two natural divisions of the squirrel family, the ground-squirrels and the tree-squirrels. The latter are graceful, agile animals, with slender bodies and very long, bushy tails. They feed mainly on acorns and nuts, but occasionally eat animal food and birds' eggs. They sit upon their haunches and handle nuts adroitly with their fore feet. They cut through the shell with their sharp teeth. The red squirrel, which represents the common squirrel of Europe, is the smallest and prettiest of our tree-squirrels. It is about eight inches long, and ranges southward from the northern limit of trees. The gray squirrel is one of the best-known species. It reaches a length of about ten inches, and is common east of the Rocky Mountains from Canada to the Gulf of Mexico. It is subject to great color variations, being sometimes black. This tendency for one species to vary in color is common to all tree-squirrels. Other gray squirrels are found in the western parts of the United States. The fox-squirrel is the species found east of the Great Plains. It reaches a length of 12 inches, and has a large tail of about the same length. Tree squirrels have nests both in branches and hollow trees. The latter are also used for food storage and winter homes. The ground-squirrels make burrows, which they also supply with food. North America is the richest of all countries in ground-squirrels. The group includes such forms as woodchucks, prairie-dogs gophers and chipmunks. The latter, called also striped squarrels, are the best known. They stand on the dividing line between the burrowing forms and the tree-squirrels. All have cheek-pouches, in which their stores are carried to their nests. Tree-squirrels are good eating, and the fur of those inhabiting Siberia and Russia is of commercial value.

Sta'bat Ma'ter ("the mother was standing") is a celebrated Latin hymn on the seven sorrows of the Virgin Mary. It has been set to music by many composers, among them Haydn and Rossini. It dates back to the 13th century, and is thought to have been written by Jacopone, a Franciscan monk. It is used by the Roman Catholic church in its services in passion-week.

Sta'dium, originally the Greek measure of length or distance when undertaking a journey; also used by the Romans as a linear measurement. As used at the foot-race course (*stadium*) at Olympia, it indicated one eighth of the Roman mile or a little over 600 English feet. The term has come to be applied to the structures erected on race-courses and athletic fields, from which spectators witness games or contests. The stadium recently restored at Athens and the stadium of Harvard College in the United States are examples.

Stäel (*stä'ĕl*), **Madame de,** a celebrated Frenchwoman, was born at Paris, April 22, 1766. Her maiden name was Anne Louise Germaine Necker, as she was the daughter of Necker (*q. v.*), the French statesman. She wrote romances in her girlhood and a volume of *Letters to Rousseau.* She was married in 1786 to the Baron de Stael-Holstein, the Swedish ambassador at Paris, from whom she separated in 1798, though only to save her fortune from his debts, hastening to his bedside when he died. This marriage made her the center of the brilliant society of Paris, for which she was fitted by her wonderful powers of conversation and her strong enthusiasm and passion. She believed in the Revolution, but hated its horrors, making a vain effort to save the life of the queen and saving Montmorenci and other friends from the guillotine at the risk of her own life. She left Paris in 1792, spending four months in London; "four months of happiness saved from the shipwreck of a life" she called them. In 1797 she returned to Paris, where her great influence made Joseph Bonaparte anxious to win her to his brother's cause by offering to secure for her $4,000,000, which was owing to her father from the treasury. She refused the gift, afterwards accepting it from Louis XVIII. Napoleon hated her; and, finding her *salon* the center of the disaffected party and himself the butt of the brilliant wit of her circle, he banished her from Paris. She went to Weimar, adding to her intimate circle Schiller, Goethe and Schlegel. Her book on *The Influence of the Passions* was published in 1796, and the famous one on *Literature Considered in Its Relations to Social Institutions* in 1800; and after her father's death she wrote his life. Her first romance was *Delphine,* her own story, followed by the well-known *Corinne,* written in 1805, after a sojourn in Italy, which made her name known throughout Europe and revealed Italy to France. Her *Germany* was finished in 1810 and approved by the censorship, but when 10,000 copies had been printed, the whole edition was seized and destroyed by Napoleon's order on the plea that "it was not French." The manuscript had been saved, and the book was published in London in 1813. Her exile now became imprisonment, as she was surrounded with spies, her friends exiled for visiting her, and her walks restricted to a circle of two miles around her home. She escaped to Russia and finally to London, welcomed in the principal cities, not only because of her genius, but as the enemy of Napoleon. Under Louis XVIII her old position in Paris was resumed until ended by the return of Napoleon from Elba. In 1811 she had secretly married a French officer, much younger than herself, a marriage acknowledged in her will and made public after her death by her children. She died at Paris, July 14, 1817, leaving unfinished her *Considerations upon the French Revolution*, published by her children and thought by Sainte-Beuve to be her finest work. See *Life* by Stevens and *Life and Times* by Norris.

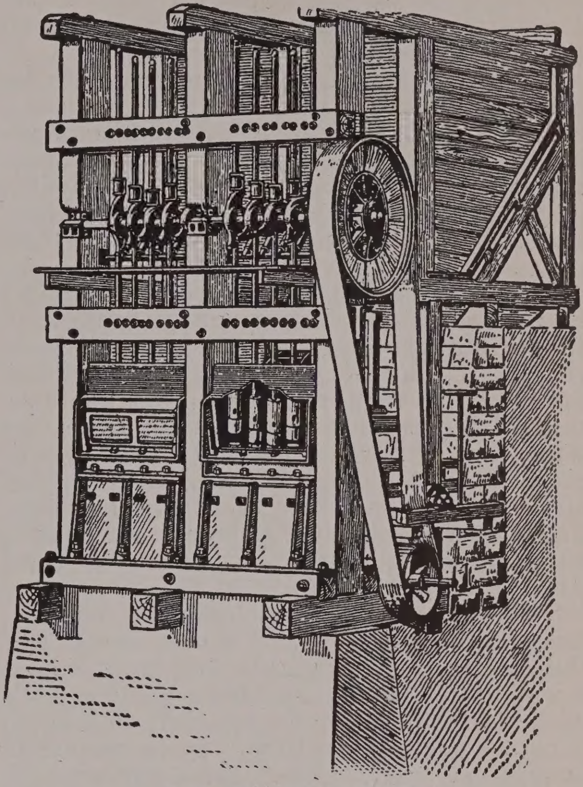
Stag, the male of the red deer which is found all over Europe and in a large part of Asia. It is a noble animal, about seven feet long, and four feet high at the shoulders, with large, branching antlers. It has been driven from inhabited districts, and is now found only in deep forests. In Scotland it is hunted by a form of stalking, but in England on horseback. See Deer, Elk and Reindeer.

Sta'mens, in an ordinary flower the outer of the two sets of sporophylls or sporangial leaves, the carpels being the inner set. Stamens are microsporophylls, and the spores they produce are microspores (pollen-grains). See Flower.

Stam'ford, Conn., a city 33 miles northeast of New York, on Long Island Sound. It is a suburb of New York City and a summer-resort for the business men of the city, whose handsome homes are on all the surrounding hills. There are iron and bronze foundries, manufactories of hats, drugs, sashes, blinds and locks. The town was settled in 1641. Population, 34,000.

Stamp-Act, a measure for raising revenue by requiring the use of government stamps on all legal documents used in the British colonies in America. It was passed in 1765, and was resisted by the colonies because they denied the right of the English Parliament to tax them without representation; that is, without their having a voice by their delegates in the matter. Riots took place in many towns, and the stamped paper was seized and destroyed. A congress of nine states met and claimed the right of taxation for their own assemblies. The stamp-act was repealed by Parliament in February, 1766, after a great debate in which Burke made his first speech, and Pitt took the side of the colonists in one of his greatest speeches.

Stamp-Mill. A stamp-mill is a mill in which ore is pounded into particles so fine that the metal it contains is separated from the ore-stuff. Stamp-mills are commonly used for crushing gold or silver-bearing quartz. The stamps are stems of wrought iron two to three inches in diameter and ten to 15 feet long. At the bottom of the stem is a head eight to 12 inches in diameter and 15 to 20 inches long, into which is set a movable steel or cast-iron shoe, the diameter of which is the same as the head and the length somewhat less. When equipped, the stamp ordinarily weighs from 400 to 1,000 lbs. The ore is caught and crushed between the falling stamp and a die of the same material and diameter as the shoe. Ordinarily the ore is fed into a mortar box containing five dies set on a level and in line. The box is enclosed, except for openings for the stems, the ore and water. Across the lower part of one side is stretched a screen of wire-mesh or perforated plate. The size of the openings in the screen is determined by the fineness of crushing required in order to separate the metal from the ore-stuff. The five stamps that pound in the same battery are dropped in succession, and so the ore and water are driven from side to side. Particles crushed sufficiently small are washed through the screen.



TEN-STAMP BATTERY

Before the ore is fed into the mortar-box it must be broken into fragments from one to three inches in diameter. This is usually done by a machine called a rock-breaker, which rubs and presses the rocks between two hard corrugated surfaces. In the modern stamp-mill the ore is dumped into great bins and then handled entirely by machinery.

The gold or silver that is free from chemical combination is caught on plates over which the stream of sand and water flows after leaving the battery. These plates are usually made of soft copper, which is rubbed with quicksilver until its surface forms an amalgam. This catches or amalgamates the gold or silver that comes in contact with it. The amalgam can then be scraped off and the gold or silver separated from the quicksilver. Sometimes gold is so fine that it floats on the surface of the water and does not touch the plate. Much of this floating gold can be caught on blankets over which the stream is made to flow. Still more important are the processes by which the chemical combinations containing gold or silver, especially pyrites, are caught and saved. As pyrites is heavier than the ore-stuff, it can be separated by a process of shaking and settling The machine by which this is done is called a concentrator or vanner, and most stamp-mills find it profitable to be well-equipped with these. Consult Huntington and McMillan's *Metals: their Properties and Treatment.*

Stamps are issued by governments for use on documents, merchandise, letters etc. Stamp-duties were first imposed in England in 1694. It is a form of indirect taxation, the stamps being bought of the government, the use of them required by law, and any forgery of them punished. During the Civil War in the United States many articles paid stamp-duty, the last of such taxes being repealed in 1883. In 1898 similar duties were imposed to help meet the cost of the Spanish-American war; but Congress in 1901 removed most of these taxes. Stamps for the payment of letters were first generally used in England in 1840, at the suggestion of Sir Rowland Hill, and in the United States in 1847. The first English postage-stamp was black, with a portrait of Queen Victoria, and since then about 1,600 different stamps have been in use in England and her colonies. The first United States stamp had the portrait of Franklin and was worth five cents. There have been a great variety used since, as many as 127 different kinds being in use at one time. Some countries have used the national arms on stamps, and some simply a number with an inscription. Stamp-collecting became fashionable about 1864 and has developed into a science called philately, with periodicals and associations devoted to the pursuit. Rare stamps command large prices, an English one of 1847 with the postal mark bringing about $375.

Stand'ard Oil Company, a company or group of companies originally organized by John D. Rockefeller, which has almost a monopoly of the oil-industry in many states of the American Union. It not only supplies the markets of the United States, but exports great quantities of oil abroad. Many charges have been urged against its business methods in ousting competitors, as also concerning its alleged political influence. In 1907 the company was convicted of accepting railroad rebates and fined $29,000,000, but this was set aside on appeal. In 1911 the United States Supreme Court sustained a decision made in 1909 by the Circuit Court of the United States declaring the company an illegal combination in restraint of trade and by the court's order, the parent company and its nineteen subsidiaries were separated from each other and conducted under separate management.

Standards are weights and measures defined by proper authorities. National standards are defined and preserved by the respective governments of those who use them. There practically are only two groups of standards in use, the *British* and the *metric* group.

The British system is founded upon the standard yard, the standard pound and the standard gallon. The metric system is based upon the standard meter, the standard kilogram and the standard liter. See KILOGRAM, METRIC SYSTEM, POUND and YARD.

Besides these, the requirements of commerce and of modern science have made necessary standard thermometers, standards of electrical resistance, standards of light etc. Thus the mercury thermometer, which has been compared directly with the nitrogen gas thermometer at the international bureau of weights and measures at Sèvres, is practically a standard thermometer. The Hefner lamp, as tested by the Reichsanstalt at Charlottenburg, Prussia, practically is a standard for sources of light. But these standards, like the ohm, which is the standard of resistance, and the Clark cell, which is the standard of electromotive force, are defined in so definite a manner that they can be copied or made by any one who is equipped to follow the legal prescriptions; and hence they are represented by material or arbitrary standards, as in the case of the meter. See MEASUREMENT.

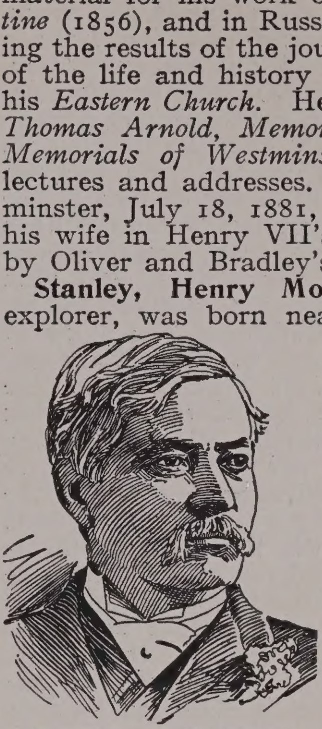
Stan'dish, Miles, one of the *Mayflower* company, was born in Lancashire, England, about 1584. He served in the army in the Netherlands and sailed with the Pilgrims in the *Mayflower* in 1620, though not a member of the Leyden congregation On reaching Massachusetts he was chosen captain by the Pilgrims, and commanded in expeditions against the savages. He settled finally at Duxbury, Mass., where he died on Oct. 3, 1656 A monument, 100 feet high, crowned by a statue, has been built to his memory at Duxbury. The story of his unsuccessful effort to secure a wife is told by Longfellow in his *Courtship of Miles Standish*, which, however, is not free from anachronisms and inaccuracies. Consult *Life* by Abbot and *Footprints of Miles Standish* by De Costa

Stan'ford, Leland, American public man and philanthropist, was born at Watervliet, N. Y., March 9, 1824, and died at Palo Alto, Cal., June 20, 1893. Early in life he studied law and was admitted to the New York bar; but in 1849, attracted by the gold-discoveries in California, he proceeded there and engaged in gold-mining and in business in San Francisco. He was one of the organizers of the Central Pacific Railroad Company, and entering political life was made Republican governor of California (1861–3). From 1885 to 1893 he was United States senator. Out of his large money amassings he gave property to the value of $20,000,000 to found, in memory of a deceased son, a university at Palo Alto, to be known as the Leland Stanford Junior University — a princely and most useful benefaction. See Palo Alto.

Stan'hope, Lady Hester Lucy, was born at London, England, March 12, 1776. For three years she lived with her uncle, William Pitt, as the manager of his household and his most trusted confidant, and at his death was given a pension by the king. In 1810 she began the life that made her famous, wandering on the eastern shores of the Mediterranean and settling in 1814 among the half-savage tribes of Mount Lebanon. She adopted the customs, costume and religion of the Mohammedans, and obtained great influence over the people, who looked upon her as a prophetess. The old convent where she lived was fortified and garrisoned by Albanians and became a refuge for all who needed help. She is said to have sheltered several hundred refugees after the siege of Acre. Her last years were spent in poverty, and she died near Mount Lebanon, with only natives around her, June 23, 1839. See *Memoirs*, published by Dr. Meryon.

Stanhope, Philip Henry, Earl, an English historian, was born at Kent, England, Jan. 31, 1805. He studied at Oxford and entered the house of commons, where he helped to secure the passing of the Copyright Act in 1842. His historical works, which rank very high, are *War of the Succession in Spain; History of England from the Peace of Utrecht to the Peace of Versailles;* and *History of Spain under Charles II.* He also wrote lives of Belisarius, Condé and Pitt, and edited *Chesterfield's Letters.* He is also known by his courtesy title of Lord Mahon. He died at Bournemouth, England, Dec. 22, 1875.

Stan'ley, Arthur Penrhyn, dean of Westminster, was born at Alderley, Cheshire, England, Dec. 13, 1815. He was educated at Rugby, under Dr. Arnold, and at Oxford. At Rugby he was mentioned as the delicate boy in *Tom Brown's Schooldays*, who, trembling with fear, still knelt to say his prayers in spite of the jeers and rough usage of his companions. At Oxford he took the Ireland scholarship, the Newdigate prize for a poem and a first-class degree; was made a Fellow of University College; and after traveling in the east became a tutor in the college. In 1851 he became canon of Canterbury; in 1856 professor of ecclesiastical history and canon of Christ Church; and in 1863 dean of Westminster. As a preacher at Westminster Abbey he had a wide influence, and a great multitude thronged the church whenever it was known that he was to preach. As a leader of the Broad-Church party, he invited clergymen of the Scottish church and of the Free-Churchmen of England to address his evening congregations. In 1852–3 he traveled in Egypt and Palestine, gaining material for his work on *Sinai and Palestine* (1856), and in Russia in 1857, embodying the results of the journey in his pictures of the life and history of Russia found in his *Eastern Church.* He was the author of *Thomas Arnold, Memorials of Canterbury, Memorials of Westminster Abbey* and of lectures and addresses. He died at Westminster, July 18, 1881, and was buried by his wife in Henry VII's Chapel. See *Life* by Oliver and Bradley's *Recollections.*



HENRY M. STANLEY

Stanley, Henry Morton, the African explorer, was born near Denbigh, Wales, Jan. 28, 1841. His name was John Rowlands, and at 14 he worked his way as a cabin-boy to New Orleans, where he obtained employment in the office of a merchant named Stanley, whose name he afterwards took. After the death of the merchant he entered the Confederate army, was taken prisoner, and later served in the United States navy. In 1867 he was a correspondent for the New York *Tribune* in an Indian expedition, and in the same year entered the service of the New York *Herald.* In 1867 he accompanied Lord Napier's expedition to Abyssinia as special correspondent for the *Herald*, and such were his enterprise and skill that the news of the fall of Magdala first reached the British government through the New York *Herald.* While in Spain, still acting as a newspaper-correspondent, he was called to Paris, where he received the order from the editor of the *Herald* to "find Livingstone." Traveling by way of Egypt, Palestine, Turkey, Persia and India, in January of 1871 he reached Zanzibar, and in March set out on his first journey into the heart of the dark continent. Two white men who started with him turned back, but Stanley pressed on with his band of natives, showing the courage and perseverance which have given him so high a place in the long roll of African explorers. He found Livingstone on Nov. 10 at Ujiji on Lake Tanganyika, and stayed with him four months, exploring the northern end of the lake and proving that it has no connection with the Nile. He reached England in August, 1872, where he was received with enthusiasm by the whole nation. *How I Found Livingstone*, published in the following November, had an enormous sale. As correspondent for the *Herald* he was in the Ashanti campaign, reaching England in time to be present at the funeral of Livingstone in Westminster Abbey.

The death of Livingstone aroused a great desire in Stanley to complete his work. The New York *Herald* and the London *Daily Telegraph* fitted out an expedition, giving him the command, and he left England in August, 1874, for his second African journey. With 350 men he started in November into the interior. He was ten months in crossing from the eastern to the western coast, arriving at the mouth of the Kongo a white-haired man, the only survivor of his white companions, and with scarcely a third of his native troops. *Through the Dark Continent*, the story of this journey, is more exciting than any romance. The direct results were the determining of the boundaries of Lakes Victoria and Tanganyika and the tracing of the Kongo from the heart of Africa to the Atlantic, thus changing materially the map of Africa. The opening of the Uganda region to missionaries, the forming of the Kongo Free State and the general scramble for Africa among European nations followed. Stanley acted from 1879 to 1884 under the king of Belgium in organizing the Kongo Free State, returning afterwards to the United States, where he delivered lectures on his African work. In 1889 he was sent in command of an expedition for the relief of Emin Pasha. He left the mouth of the Kongo on June 15, divided his forces at Yambuya, 1,300 miles from the sea, was for months hid from the civilized world, but, through disaster and loss of friends and followers, pressed on until he found Emin on the shores of Lake Albert. On this journey he discovered a great forest in the northern part of the Kongo basin and the huge snow-capped summit of Ruwenzori, 18,000 feet high. Other of his works are *In Darkest Africa*, *My Dark Companions*, *Slavery and the Slave-Trade; The Kongo and the Founding of its Free State; Coomassie and Magdala;* and *Through South Africa.* In 1899 he was knighted. He died on May 9, 1904. See *Life* by G. Mercer Adam.

Stan'ton, Edwin McMasters, an American statesman, was born at Steubenville, O., Dec. 19, 1814. He graduated at Kenyon College, and practiced law at Steubenville, at Pittsburg and finally at Washington. In 1860 he was made attorney-general of the United States, and in 1862 secretary of war. This important position he held during the Civil War, and many decisive movements of the army were made at his suggestion. Difficulties with President Johnson led to his resignation in 1868, Congress passing a vote of thanks for his ability and faithfulness. He was nominated judge of the supreme court by Grant, but died on Dec. 24, 1869, before his commission was made out.

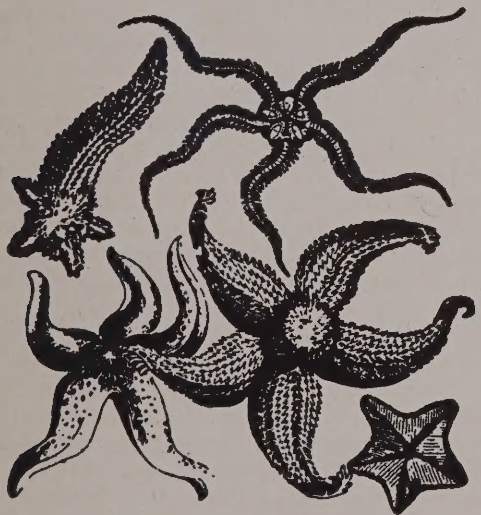
Stanton, Eliz'abeth Ca'dy, an American reformer, was born at Johnstown, N. Y., in 1815. Her attention was first drawn to the wrongs of women in her father's law-office, where she heard their bitter complaints of the injustice of the laws. When fitted for college, having won the first prize in Greek, she could find no college that would admit a woman, and when attending the world's antislavery convention in London in 1840 with her husband who was a delegate, all the women-delegates were refused admission. One of these was Lucretia Mott, with whom she joined in the work of reform, the first woman's rights convention being held at her home in Seneca Falls, N. Y., July, 1848. From this time she continued to be one of the most prominent workers in the cause, addressing conventions, and political and legislative bodies. She died on Oct. 25, 1902.

Star-Cham'ber, a court which met in the council-chamber of the palace of Westminster. The roof of the room was decorated with gilt stars, which are supposed to have given the court its name. It was founded or restored in 1487 by Henry VII to assist in bringing to justice the great landowners and nobles. It was independent of a jury, who were too often afraid of the nobility, and could inflict any punishment but death. The trial was conducted by written questions, unless the accused chose to confess. This confession became such an abuse, torture being used to extort it, that in 1641 the court was abolished.

Star of Bethlehem, a class of plants belonging to the lily family, somewhat like the hyacinth. It is a native of the eastern hemisphere. The common variety comes from France and Switzerland, and is found everywhere in gardens, with its clusters of white flowers and narrow, green leaves growing from bulbs.

Starch, a vegetable substance found in most plants, particularly in the seeds, bulbs, tubers etc. For commercial purposes starch is obtained from numerous plants, chief among which are wheat, corn, rice and potatoes. It has the same elements as sugar — carbon, hydrogen and oxygen — but in different proportions. It is made of small round grains or granules, which differ in shape in each species of plant. As usually prepared, it either is a white powder or irregular white columns, which come from the breaking up of a dried cake of the material. It does not dissolve perfectly in cold water, but with hot water the granules burst, forming a clear paste, which is the starch used in the laundry. When heated to about 320°, it is changed into dextrine, the gum used on postage-stamps. Starch is found especially in cereals, potatoes, carrots, parsnips, sago, tapioca and rice. Potatoes are about one-fifth starch; rye, oats, wheat and corn nearly two thirds; and rice about nine tenths. Starch is made from corn by soaking it 48 hours in water, then grinding it and straining through sieves, after which the starch is allowed to settle in vats, when it is washed, bleached and dried. Potato-starch is made by grating potatoes, adding water and straining, settling, washing and drying. Wheat-starch and rice-starch are made by slightly different processes, to remove the gluten they contain. Arrowroot, tapioca, sago and cornstarch are forms of starch used as food. Starch is also used in the manufacture of calico and other cloths, in mounting photographs and in the laundry. It is also used in the manufacture of glucose, (*q. v.*). Cornstarch was first made in the United States in 1842. The factories at Oswego, N. Y., and Glen Cove on Long Island are the largest starch-factories in the world. There are about [illegible] starch-factories in the United States, making corn, wheat and potato starch, of which 10,000,000 pounds are exported yearly.

Star′fish, the name for a number of marine animals having arms or rays arranged around a central disk. As these are symmetrically arranged, the animal is said to have radial symmetry. There are several varieties, but the common five-rayed starfish is the type. It is reddish, or yellow, in color, and those along the New England coast commonly vary from one inch to one foot in diameter. It lives on the sea bottom and crawls sluggishly by means of tube feet. It is often seen in shallow pools left by the retreating tide. The skin is stiffened with plates and nodules of lime. The mouth is in the center of the disk, on the under side, and the animals feed on decaying fish and other animal matter, as well as on small shelled mollusks. Their means of locomotion is peculiar. There are four rows of tube-feet in furrows along the lower sides of the arms. These tube-feet are filled with water and connected with a system of water tubes running through the body. On the back of every starfish may be seen a little rounded knob, which is porous and leads into the water-vascular system. From this tubercle, a tube leads downward to join a circular canal surrounding the mouth, and from this central canal a tube extends into each arm or ray. These latter canals are connected with the tube-feet and also with internal pockets, one for each tube-foot. The nervous system consists of a ring about the mouth and a nerve running from it into each arm. At the extremity of each arm is found a little red eye-spot which is sensitive to light. Some other starfish have 11 to 13 rays, and some resemble five-sided pin cushions in form. The brittle starfishes have a central disk, with long, slim, muscular rays by means of which they move. Their tube-feet are not developed. All starfishes possess the power of restoring, or regenerating, lost or injured parts. See ECHINODERMATA and SEA-URCHIN. Consult Romanes' *Jelly-fish, Starfish and Sea-Urchin.*



STARFISH

Stark, John, an American soldier, was born at Londonderry, N. H., Aug. 28, 1728. He served in the French-and-Indian wars and at Ticonderoga in 1758. At Bunker Hill he was colonel of a regiment which he had enlisted; and was at the front in the attack on Trenton and in the battle of Princeton. He raised a new regiment in 1777, and was given command of the New Hampshire troops sent against the British troops from Canada. On Aug. 16, 1777, he fought the battle of Bennington (known in New York as Walloomsac), receiving for it the thanks of Congress and the rank of general. With a new force recruited by him in New Hampshire he cut off Burgoyne's retreat from Saratoga, and after serving in Rhode Island and New Jersey had charge in 1781 of the northern department, with headquarters at Saratoga. He died on May 8, 1822, the last but one of the generals of the Revolutionary army. See *New Hampshire Soldiers in the War* by Hammond and *Life of John Stark*, by Edward Everett, in Sparks' "American Biography."

Star′ling, a name for a number of common birds found only in the Eastern hemisphere, but lacking in Australia. This is the more remarkable as a starling is found in New Zealand, and others in various southern Pacific islands. The common starling of Europe is the best known. It is a beautiful bird with a dark plumage, having metallic green and purple reflections, and each feather tipped with buff. It nests near houses in bird boxes, when they are provided, and is easily tamed. It can be taught different notes and also to speak words; it is therefore often caged. They kill an immense number of insects and are beneficial to the gardener. A starling inhabiting the steppes and plains of Western Asia devours so many locusts that it is called the locust bird. The oxpecker of Africa is also a starling.

Stars, those heavenly bodies which appear as bright points having fixed positions in the sky. The spectroscope in the hands of Fraunhofer, Huggins and others has shown that these so-called fixed stars really are gigantic and very distant suns; for they give continuous spectra crossed by dark lines, indicating, as in the case of our central luminary, a solid or liquid core surrounded by incandescent vapor.

Ptolemy and Hipparchos divided the stars visible to the naked eye into six different groups, according to their brightness. These groups are called *magnitudes*, and since the invention of the telescope this classification has been so extended that astronomers grade stars into 14 or 15 groups. In the first magnitude they place the 14 brightest stars, including Sirius, Vega, Arcturus, etc.; in the second group are 48 stars, including the Pole Star and two Pointers; in the third 152; in the fourth 313; in the fifth 854; and in the sixth 2,010, making a total of 3,391, which are practically all the stars which can be seen without the aid of a glass. The number of stars which can be photographed, or which can be seen with our largest refracting telescopes, runs into the millions. The distances of the fixed stars are known only in a few cases, and even then very roughly. This quantity is determined by measuring the annual parallax of the star, a quantity which, except in a very few cases, is so minute as not to exceed the errors of measurement. The nearest star, so far as as known, is *a* Centauri, whose parallax is only ¾ of a second of arc, and even this, our nearest neighbor, is at the stupendous distance of four "light-years," *i. e.*, at a distance such that light would require four years to traverse it.

The student should bear in mind that, although these stars are said to be fixed, most of them exhibit, in fact, a small amount of motion, say, a second or so in a year. In addition to this motion across the heavens, which is measured in angle and is called *proper motion*, nearly all stars exhibit a motion toward us or away from us, which is called *motion in the line of sight*. The measurement of this latter motion is one of the recent achievements of the spectroscope, based on Döppler's principle. Consult Miss Clerke's *System of the Stars;* Chambers' *The Story of the Stars;* Lockyer's *Meteoric Hypothesis;* and Scheiner's *Astronomical Spectroscopy*. See NEBBULA, PARALLAX and TELESCOPE.

Star-Span'gled Banner, The. Words by Francis Scott Key, adapted to the old air *Anacreon in Heaven*. This air was the constitutional song of The Anacreontic Society of London, always sung by an official of the society at the supper with which it was customary to close the musical season, near the end of the 18th century. The tune was probably composed by Doctor Samuel Arnold (1740–1802). It became known in America in 1798, being sung at an anniversary meeting of the Massachusetts Charitable Fire-Society, to words by Thomas Paine, who later changed his name to Robert Treat Paine. Subsequently there were settings of other words to this tune, popularly known as *Adams and Liberty*. Further details regarding the tune and Key's words may be found in a pamphlet by Stephen Salisbury, Esq., of Worcester, Mass., and in *The National Music of America and its Sources* by Elson, Boston, 1899. See KEY, FRANCIS SCOTT.

Stat'en Island, the chief island in New York Harbor, forming Richmond County, N. Y., and the borough of Richmond in the enlarged city now known as Greater New York. It received its name from early Dutch settlers in honor of the states-general (Dutch *Staten*). It has an area of 58½ square miles, and is about 13 miles in length and eight in breadth. It is separated from Long Island by the Narrows and from New Jersey by the Kill von Kull and Staten Island Sound, and has steam-ferry communication with New York City and with New Jersey, while the Staten Island Rapid Transit Railroad reaches the towns, villages and watering places of importance on the island. Close to Clifton is Fort Wadsworth, and on the north shore is Sailor's Snug Harbor, an asylum for aged and infirm mariners. At Stapleton is a United States marine hospital, and between St. George and Tompkinsville is a United States lighthouse-station. On the island are the residences of many of the business men of New York City. Population 85,969.

States Gen'eral, The. In France the convocation of the representative body of the three orders of the French kingdom (representing the nobility, the clergy and the bourgeoisie) for deliberating on matters of public importance. It corresponded somewhat to our Congress. Under Charlemagne the national assembly was made up of nobles and clergy, a practice continued till about 900. Thereafter we have no trace of such an assembly in France till 1302 when Philip the Fair revived the states general, including representatives of the citizens because he hoped to gain their support in his struggle with Pope Boniface VIII. During the Hundred Years' War (1337–1453) it played an important rôle in connection with the revenues and taxation. It was not yet a law-making body. As kings gained power, backed by a standing army, they grew more independent and the states general was not convoked from 1614 to 1789, when the refusal of the citizen members to count the vote by orders initiated the French Revolution. Thereafter the representative assembly of France took on various names, usually The National Assembly.

In Holland the name of states general is applied to the legislative body of the kingdom. It is composed of two houses, the upper elected by the provincial states and the lower chosen by the citizens.

States' Rights, a term used in the United States to indicate a doctrine, based upon an understanding of the constitution, which assumes that the different states of the Union are independent and that the citizens of a state owe allegiance only to the state; that the states are joined together only for certain purposes; and that the acts of the general government must be approved by the separate states, which possess the right also to nullify or pronounce them of no authority or, if necessary, to secede from the Union. The first appearance of this idea was in 1798, when the legislatures of Kentucky and Virginia protested on this ground against the alien and sedition laws which permitted the president of the United States to remove from the states aliens or foreigners whose presence might be considered dangerous and to punish sedition in the states. In 1811 and in 1819 the matter recurred in connection with the United States Bank charter, Henry Clay and Maryland claiming that the government had no authority to create a bank. In 1832 South Carolina attempted to carry the principle into action by pronouncing the high tariff "null and void" and not binding on its citizens. The passage of a compromise tariff-law settled the trouble for that time. In 1860-61 the southern states carried out the principle by seceding from the Union, and their action was followed by the Civil War.

State University of Iowa, located at Iowa City, was founded in 1847. It comprises a college of liberal arts, including civil and electrical engineering, colleges of law, medicine, dentistry, pharmacy and a school of pedagogy. It is open to students of both sexes, and has an attendance of 2,000, with a faculty of 165 and a library of 65,000 volumes. Its productive funds amount to $240,320; its annual income is $324,048.

Statics (*stăt'ĭks*), a branch of mechanics. In pure mechanics (or dynamics, as it is frequently called), the effects of forces upon bodies are considered. If the effect of forces upon a body is to change the rate of motion of the body, the forces acting are said *not* to be in equilibrium. Forces and effects of this kind are studied under the head of kinetics. In all other cases forces are said to be in equilibrium and are studied under the head of statics. If one hold a steel-spring in his hands and bend it, he recognizes that there are forces acting upon the spring by the fact that the shape of the spring is temporarily changed. These forces do not produce any motion in the spring; they are in equilibrium. It is this group of forces which is considered under the head of statics. For another illustration allow a locomotive to stand at rest on a steel bridge. The bridge sags slightly as the locomotive takes up its position. But the upward force with which the bridge tends to regain its original shape is exactly equal and opposite to the weight of the locomotive. These stresses produced by the locomotive and the strains which result from them illustrate the kind of problems studied under the title of statics.

Statics may, therefore, be defined as the science of the equilibrium of forces. It is very important in this connection for the student to distinguish carefully between a body which is at rest and one which is in equilibrium. A pendulum bob at the end of its swing is in rest; but it is not in equilibrium, for at that very instant it is being set in motion by its weight. The two general conditions of equilibrium for any body are that the sum of all the forces acting upon the body shall be zero and that the sum of all the moments of force acting upon the body shall be zero.

The application of these general principles to the cases of simple machines, as the lever, inclined plane etc., is the portion of statics ordinarily studied in physics; while the application of these principles to various structures, as bridges, roofs etc., is the part of statics which is pursued by engineers. The conditions under which fluids remain in equilibrium form the science of hydrostatics.

Stevinns (1548–1603) showed that a force can be completely represented by a straight line. Upon this simple fact a branch of mathematics called graphical statics has been recently founded, and has furnished many elegant geometrical solutions of engineering problems. For an unusually interesting history of statics see Mach's *Science of Mechanics*. Minchin's *Treatise on Statics* (Clarendon Press) contains an extraordinarily clear presentation of the entire subject.

Staunton (*stan'tŭn*), **Va.**, a city, the seat of Augusta County, on the Chesapeake and Ohio and Baltimore and Ohio railways, over 110 miles northwest of Richmond. It has waterworks and an electric-light plant, both of which the city operates, substantial public buildings, the city-hall, court-house, churches and schools, a Masonic Temple and a military academy etc. It is the seat of the Western State Hospital for the Insane, the Virginia School for the Deaf and the Blind, Virginia Female Institute and Cary Baldwin Seminary. The city manufactures (besides agricultural implements and machine-shop products) organs, overalls and wagons; it also has a flour-mill and a planing-mill. Population 10,604.

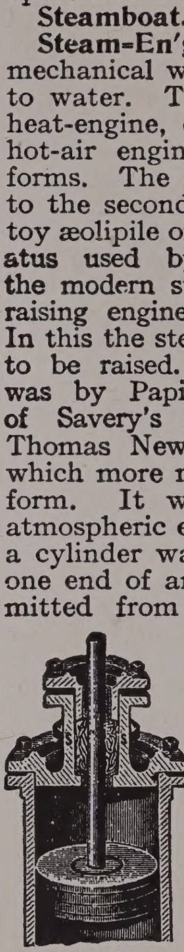
Stead, William Thomas, an English journalist, was born on July 5, 1849, at Embleton, Northumberland. At 14 he became merchant's apprentice and at 22 editor of *The Northern Echo*, Darlington. In 1880 he became associate-editor of the *Pall Mall Gazette* and in 1883 the editor. In 1890 he founded *The Review of Reviews*, one year later *The American Review of Reviews* and in 1893 *The Australian Review of Reviews.* In 1895 he began the publication of the *Masterpiece Library of Penny Poets, Novels and Prose Classics.* His interests have been social and broadly democratic. For one of his publications against existing social evils, *The Maiden Tribute of Modern Babylon*, he was put in jail for three months. His efforts in the interest of international peace have been untiring. His more important publications are *The Truth About the Navy, Truth about Russia, The Pope and the New See, The Story that Transformed the World, If Christ came to Chicago, The Labor War in the United States, Satan's Invisible World, A Study of Despairing Democracy, The United States of Europe, Mr. Carnegie's Conundrum, The Conference at the Hague, The Americanization of the World, The Last Will and Testament of Cecil John Rhodes.* He died in the wreck of the *Titanic*, April 14, 1912.

Steal Away, American Negro Song, published in *Jubilee Singers of Fisk University* by G. D. Pike. S. Coleridge Taylor has also made a transcription of the melody in his *Twenty-four Negro Melodies, transcribed for the Piano.*

Steam is the vapor of water. Water gives off vapor without being heated, but this process is usually called evaporation, and the word "steam" is limited to the vapor which arises from boiling water. Steam is lighter than air, and occupies much more space than water; a cubic inch of water will make nearly a cubic foot of steam. Water boils at 212° F. and makes steam, which has the same temperature as the water, but really contains more heat, so that the steam from a boiling teakettle will burn more severely than the boiling water. This extra heat is called latent heat, because it does not affect the thermometer. The boiling temperature of 212° F. is practically constant in vessels which have a free outlet for the steam; but in closed vessels, like boilers, the boiling-point may be raised, and much pressure is produced at the same time. The pressure increases faster than the temperature; for instance, the pressure at the boiling-point is one atmosphere, but it becomes two atmospheres at 249°, four at 301° and twenty at 444°. When the engineer opens a valve to let off steam, the rushing noise it makes shows its power. Steam is used to produce motion, as in the locomotive and other machines; in heating houses; and in other operations where heat is required.

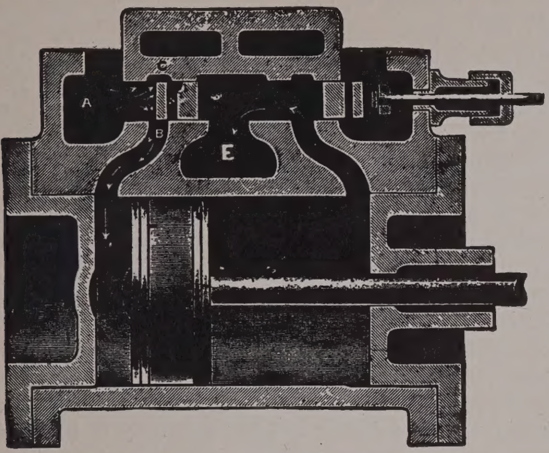
Steamboat. See STEAMSHIP.

Steam-En'gine, an apparatus for doing mechanical work by means of heat applied to water. The steam-engine is a form of heat-engine, of which the gas-engine and hot-air engine are two other commercial forms. The first steam-engine dates back to the second century before Christ in the toy æolipile of Hero and in conjuring apparatus used by priests. The beginning of the modern steam-engine was in the water-raising engine of Thomas Savery in 1698. In this the steam acted directly on the water to be raised. The first use of the piston was by Papin in 1705 in a modification of Savery's engine. In the same year Thomas Newcomen made a piston-engine which more nearly approached our modern form. It was, as its name implied, an atmospheric engine. The piston working in a cylinder was connected by a chain with one end of an overhead beam. Steam admitted from the boiler to the cylinder allowed the piston to be raised by a heavy counterpoise hung from the other end of the beam. Then the valve was shut and the steam in the cylinder condensed by a jet of cold water. This left a vacuum in the cylinder and the piston was forced down by the pressure of the atmosphere, and work was done by lifting a pump-rod which was fastened to the other end of the beam. The common story is that a lazy but ingenious boy named Humphrey Potter, who had been set to turn the valve, made the engine close and open its own valves by means of cords and thus invented the first automatic valve-gear. Newcomen's engines were used solely for pumping water from the English collieries. The modern steam-engine is due to James Watt (*q.v.*), an instrument-maker for the University of Glasgow. Watt's great advances were (1) condensing the steam in a separate vessel called the condenser, thus keeping the cylinder hot, (2) adding an air-pump to help to maintain the vacuum of the cylinder and remove the condensed steam, (3) jacketing the cylinder to prevent cooling off by conduction and radiation, (4) making the engine double-acting, that is, forcing the piston back not by the atmosphere but by steam admitted at the other end of the cylinder and (5) using the steam expansively, in other words, stopping the

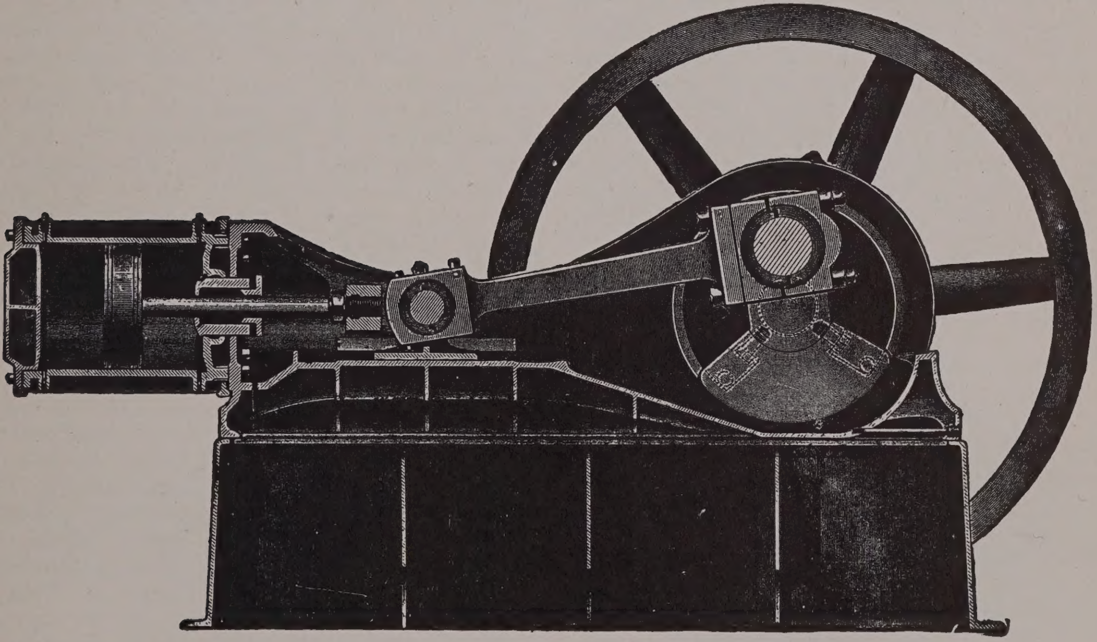


PISTON AND CYLINDER

admission of steam when the piston had made only a part of its stroke, and allowing the rest of the stroke to be performed by the expansion of the steam already in the cylinder. He also made many inventions of important details, as the throttle-valve for regulating the admission of steam, the centrifugal governor (see Governor), the indicator for studying the actions in the cylinder (see Indicator), and, in conjunction with Murdoch, the slide-valve for controlling the admission and release of steam. He also patented the use of two or more successive cylinders on one engine, or the modern compound-engine plan, which is used in all large engines where economy of fuel is important. Watt's inventive career extended over more than a half century, and he is rightly called the father of the modern steam-engine. For the full history of the steam-engine, see Thurston's *Growth of the Steam-Engine.*



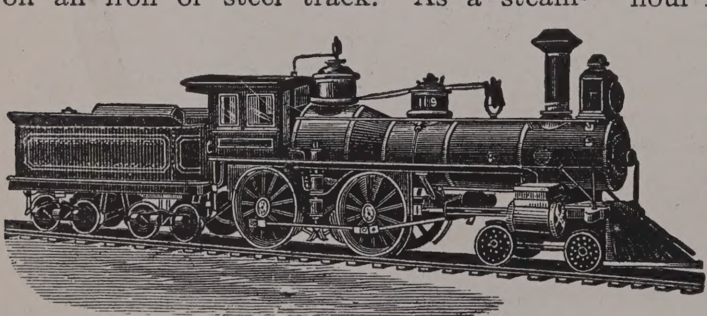
PISTON-CYLINDER AND SLIDE-VALVE



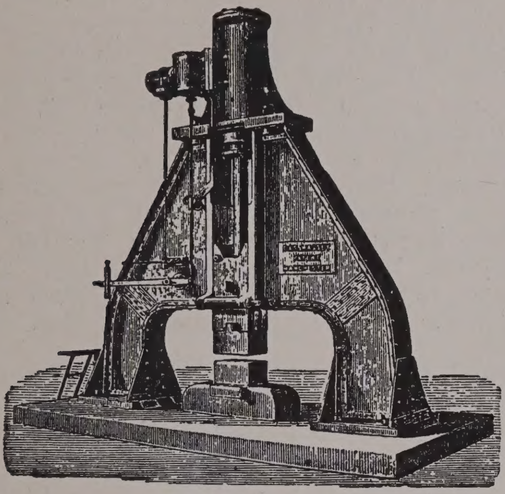
SECTION OF STEAM-ENGINE

The action of a simple steam-engine with the slide-valve, one of the simplest forms, can be easily studied from the diagram. This is a horizontal section of a cylinder, showing the piston in the cylinder and the valve below. As shown, the piston has reached the extreme left of the cylinder, and the port B on the right is connected with the exhaust E. This exhaust connects with the atmosphere in noncondensing engines, or with the cold condenser in condensing engines. Live steam is at the same time entering the left end of the cylinder at B from the steam-chest A, thus moving the piston back to the right. The time of the admission and cut-off of the steam and the connection with the exhaust is fixed by the mechanism which moves the valve. The number of valve-mechanisms in use is very great, but they all serve the general purpose seen above. Among the best known valve-mechanisms is that due to George H. Corliss. In the Corliss valve-mechanism there are two separate ports at each end of the cylinder, one for the steam-chest and one for the exhaust. This or a modified form is often used on large engines. To convert the straight-line backward-and-forward motion of the piston into rotary motion, a connecting rod and crank on a fly-wheel are used. The efficiency of a steam-engine depends largely upon allowing the steam to expand so far as possible, so that its temperature and pressure are as low as possible when it leaves the cylinder. Steam is consequently not used at full pressure through the whole stroke, but connection with the steam-chest is cut off at a proper fraction of the stroke and the piston is then moved by the expansion of the steam. Steam-engines are rated in horse-power, one horse-power representing the work of 33,000 foot-pounds per minute. (See DYNAMOMETER.) The performance of a steam-engine is indicated by the pounds of steam or water it consumes per horse-power per hour. For noncondensing engines 35 lbs. of steam at 100 lbs. pressure is a common performance. The best large condensing engines give records of from 17 to 20 lbs. of steam at 100 lbs. pressure for one horse-power for one hour. The following are terms used to designate different forms of engines. Horizontal, inclined and vertical refer to the position of the cylinder. High and low, as applied to speed, are relative terms. A speed of 150 revolutions per minute is a medium speed. Much above or below this is called high or low. Noncondensing and condensing are terms referring to the exhaust. In a noncondensing engine the exhaust is directly into the air; in a condensing engine the exhaust steam is condensed usually by contact with cool running water. Simple and compound are terms referring to the number of expansions used in the engine. In a simple engine there are a single cylinder and a single expansion; in the compound engine there are at least two cylinders and two expansions. Compound engines are more economical. Rotary engine is a form of engine in which the piston rotates. In the common steam-engine the piston moves backward and forward. A rotary engine has the very decided mechanical advantage of compactness and of direct application of power without crank and fly-wheel, but no rotary engine of the many that have been invented has ever shown itself economical or durable, except the steam-turbine. (See TURBINE.)

A LOCOMOTIVE is a steam-engine so arranged with wheels as to drive itself on an iron or steel track. As a steam-engine the locomotive has a number of special features. It carries its furnace and boiler with it, and must also be supplied with an auxiliary car or tender for carrying water and fuel. The engine is double, that is, there is a high-pressure cylinder with piston on each side of the locomotive. Many modern locomotives are also compound steam-engines, that is, the steam-expansion takes place in two cylinders, a high-pressure and a low-pressure cylinder. The steam-pressures commonly used are from 150 to 200 pounds per square inch. The oscillating, straight-line motion of the piston is converted into the rotary motion of the driving wheels by the usual mechanism of a cross-head and crank. The engine must be reversible. This is accomplished by a link-motion due to Stephenson, by which the connection of the valve-mechanism with the driving parts can be shifted through an angle. A requirement of the locomotive is the development of a large power in a limited space and with a limited weight. This means the burning of a large amount of fuel per square foot of grate-area, and requires forced draft. It is accomplished by exhausting steam directly into the smoke-stack. The American and European locomotives differ little as steam-engines, but present quite different external appearances. The large cab for the engineer, the pilot or cow-catcher, the headlight, the prominent whistle and bell are striking external features of the American locomotive. The frame of the engine and boiler is also quite different, that of the European locomotives being more rigid than can be used on American railroad-tracks. The first successful locomotive is due to George Stephenson (*q. v.*), and was used to haul coal for the Killingworth colliery in 1815. At the opening of the Stockton and Darlington railroad, an English line of 37 miles opened in 1825, a Stephenson engine, weighing eight tons and capable of 16 miles per hour, was used. Of the early locomotives R. Stephenson's *Rocket* was one of the most famous. At a competitive trial of locomotives in 1829 this engine showed a speed of from 25 to 30 miles per hour. These early locomotives are pygmies compared with the heavy, high-speed machines of to-day. Speeds of 100 miles per hour have been frequently exceeded in the last few years by express-locomotives. The largest locomotive in the world is one in use on the Illinois Central Railroad for hauling freight-trains over some steep grades on its line. It was built by the Brooke Locomotive Works, and weighs, without tender, over 230,000 pounds. The largest locomotive works in the world are the Baldwin Works at Philadelphia, Pa. A. P. CARMAN.

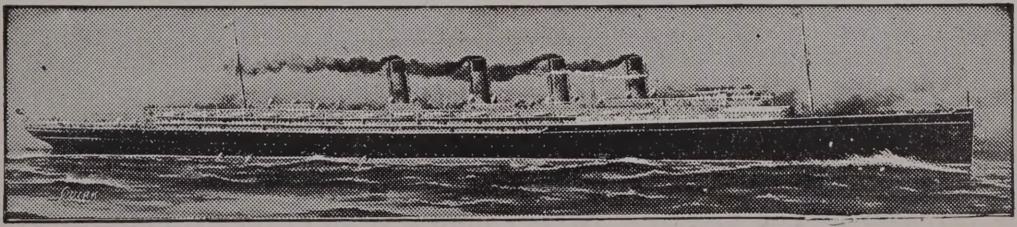


Steam-Ham'mer, a hammer which is raised by the direct action of steam on a piston in a steam-cylinder. It is used in forging iron, particularly for large and heavy work. The first idea of the steam-hammer is due to James Watt, but the first practical scheme of a steam-hammer is due to James Nasmyth (*q. v.*). His first machine was made in 1843. The piston moved by steam raises the hammer-head or "tup," until the steam is cut off and allowed to escape, when the piston with the tup falls, striking the object placed on the hammer. The blows may be so regulated as just to crack an egg or to strike with a force of tons. In modern steam-hammers the force of the blow is increased by the pressure of the steam above the piston, and by automatic valve-mechanisms the blows can be repeated with great rapidity. The largest steam-hammer ever built is that built for the Bethlehem Iron-Works in 1891. The piston with tup weighs 125 tons, the cylinder has a diameter of 76 inches, and the length of the stroke is 16½ feet. Such large hammers are no longer used, as the work is done better and cheaper by large hydraulic presses. The Bethlehem steam-hammer has been superseded by a 14,000-ton hydraulic press.



STEAM-HAMMER

Steam'ship, a vessel moved by steam. A half-successful experiment was made by Papin to use steam to propel a boat as early as 1707, but it was not until the perfecting of the steam-engine by Watt that any advance was made in steam-navigation. Early inventors of steamboats were William Henry, 1783, and John Fitch, 1785–96, in the United States and William Symmington and Henry Bell in Great Britain, but the first steam-vessel to make a voyage of any considerable length was the *Clermont*, made by Robert Fulton in 1807. She was 133 feet long, and made the voyage of 150 miles from New York to Albany in 32 hours. In the same year Col. John Stevens built at New York the *Phœnix*, which was taken around to Delaware River by sea because Fulton had a monopoly of steam-navigation on the Hudson. This was the first steamboat to make a sea-voyage. The first passenger steamboat in operation in Europe was the *Comet* on the Clyde in 1812, although a successful boat had been on the Clyde Canal as early as 1802. The first steamship to cross the ocean was the *Savannah*, a ship of 350 tons, which made the voyage from Savannah, Ga., to Liverpool and thence to St. Petersburg in 1819. Both sails and steam were used. The voyage to Liverpool was made in 25 days. The first vessels to cross the Atlantic using steam the whole distance were the *Great Western* and the *Sirius*, which reached New York on the same day, April 23, 1838. Since then the transatlantic steamship-service from New York has been continuous. All the earlier steamships were propelled by wheels at the side or at the ends. The screw-propeller was introduced by Smith and Ericsson about 1840 (see SCREW-PROPELLER), and since then all ocean-steamers and many inland steamers use it. Iron and steel have superseded wood for large ships, and steamships have continued to grow in size, power of engines and speed. The voyage from New York to England is now made in four days and fifteen hours by the fastest ship or in seven days by the slow steamers.



STEAMSHIP LUSITANIA SUNK BY A GERMAN SUBMARINE

The modern steamship has been called a floating hotel but the comparison is not strong enough. It is a floating town. It not only carries from 1,500 to 2,000 passengers beside the crew but food enough to stock a whole street of grocery and meat markets. Here are the statistics (in pounds) of the contents of the "pantry" of one of the great transatlantic liners: fresh meat, 19,800; salt beef and mutton, 14,300; ham, 2,640; bacon, 1,320; sausage, 506; poultry, 4,840; beans, peas, rice and vegetables (all kept nice and fresh along with the meat in enormous refrigerators), 25,320. One of the largest and most complete of these beautiful ships was the *Lusitania*, which was sunk by a German submarine May 27, 1915, with the loss of more than 1,000 lives, including those of women and children. The average daily coal-consumption of a typical liner is 570 tons. In the United States, steamship-building has until recent years been largely confined to vessels for inland waters. The river steamboats of the United States are fine examples of boat-building. They must ascend rivers against strong currents, and often need to travel in shallow waters and carry large amounts of freight or tow large fleets of barges. This has developed a large vessel of only a few feet draught and with very powerful engines. On the western rivers most of the boats have stern-wheels. The steamers on the Great Lakes rival ocean-steamers in speed, size and equipment. Most of them are engaged in the transportation of grain and iron-ore. Following 1883 ocean-steamship building in the United States was developed largely, owing to the impetus given by the construction of the large government cruisers and warships of "the new navy," and still greater impetus was given to the industry after the entry of the United States into the European War (*q. v.*), owing to the necessity of rapid construction of both merchant and naval vessels to cope with the ruthless German submarines. (See also NAVY, SHIP, SHIP BUILDING, and TURBINE.)

Steam-Shov'el and Dredge, a machine, worked with crane and steam-power attached, mounted on wheels for running on rails, and used for excavating clay, sand, gravel or other soil in railroad or other cuttings; also used for river-dredging, the deepening of canals etc. by a suction-process. The steam-shovel in use for heavy work has a boom, usually made of strong steel-girders, with a powerful thrusting-engine for giving ample scooping-force to the shovel, the latter generally being provided with heavy, pointed teeth for excavating loose rock. The bottom of the shovel or bucket is hinged, so that, when filled and raised, its contents are released by pulling a latch-cord and dumping the load into cart, car or other vehicle for removal. The thrusting of the shovel, as well as the hoisting and dumping, is the work of the attached engine, working along the movable crane. With a 2½ or 3 cubic-yards' shovel about 2,400 cubic yards of sand and 600 of loose rock can be excavated in ten hours. For dredging river-bottoms and delivering the mud or other material on shore, machines with belt-conveyors are used, different in pattern and varying in capacity and rapidity in work. Some varieties deliver to the shore or to a scow alongside by gravity, by means of an extensible sheet-iron trough or sipper-shovel of large dimensions.

Steam-Turbine. See TURBINE.

Steam-Whis'tle, a mechanism attached to the steam-boiler in a railway-locomotive, marine engine etc., through which the escaping steam, issuing from a narrow annular orifice in a hemispherical cup, strikes the thin edge of a bell on top and produces a loud, more or less prolonged whistle, which serves as signal or warning.

Sted'man, Edmund Clarence, an American poet was born at Hartford, Conn., Oct. 8, 1833. He studied at Yale, and began his literary career as a journalist, acting as correspondent for *The New York World* during the Civil War. He also contributed to magazines. His first volume of poetry, published in 1860, was rapidly succeeded by others. *Victorian Poets*, which has gone through several editions, appeared in 1875 and *Poets of America* in 1885. With Ellen M. Hutchinson he edited *The Library of American Literature*, and he also brought out a Household Edition of his poems. Other works edited by him include *A Victorian Anthology*, *An American Anthology*, *Poe's Works*, *Landor's Poems* and *Aldrich's Poems*. He died on Jan. 18, 1908.

Steel is iron carbonized. It is of several sorts, each possessing special properties and being made by a particular process; is extremely elastic; and has greater tensile strength than any other metal. No law of connection between its composition and its properties has been discovered, and carbon's form in steel remains undetermined. The term formerly designated a carbonized iron that would harden when heated to a certain temperature and then suddenly cooled; but only carbonized iron produced by modern methods is now considered steel. Iron is used in the industrial arts as cast-iron, wrought iron and steel, and each has marked physical properties that fit each for special purposes.

Cast iron is produced by heating iron-ores to a high temperature in a blast-furnace in connection with various fluxes, particularly limestone. The molten metal contains considerable carbon dissolved and, usually, silicon, phosphorus and sulphur. The amount of carbon in cast iron varies from 1.5% to 4.5%. Cast iron can be melted and cast in molds. It is only slightly malleable, except when specially treated, is rigid and has great resistance to crushing, but is more or less brittle and not adapted to tensile strains. Wrought iron is nearly pure iron, and in modern metallurgical processes is usually obtained by removing the carbon and other impurities from cast iron. The common method of making wrought iron is that of puddling. This consists of melting cast iron in the chamber of a flame-furnace (see FURNACE) and in removing the carbon, phosphorus etc. by stirring the molten metal and, sometimes, by adding oxidizing materials. Wrought iron is very malleable, can be welded, has a high tensile strength and shows a fibrous rather than a crystalline structure at a break. Steel has been made since very early times by a process called cementation. This consists of taking a high grade of wrought iron rolled into bars, putting these in fireclay boxes with finely divided charcoal and heating them from three to six days. This recarbonizes the iron, and produces cement or blister-steel. Bars of blister-steel may be welded together (then called shear-steel), or they may be melted in crucibles and cast, and are then called crucible-steel. High-grade tool and spring steel is made by this process, while the cheaper open-hearth and pneumatic processes are used in the manufacture of the great quantities of steel used in engineering construction-work.

The pneumatic process, universally called the Bessemer process, was invented by William Kelly (*q. v.*) of Pittsburgh in 1847, and ranks among the most important of industrial achievments The discovery was an entirely new idea revolutionized steelmaking, and supplied the most useful and precious of metals cheaply as well as abundantly. Without such steel modern railways and steamships and much machinery would be impossible. Years before Bessemer of England experimented in iron, steamers on the Ohio had boilers of iron refined by Kelly's process. This consists of burning pigiron's impurities away by blowing fine aircurrents (whence the term pneumatic) through the melted metal and pouring back the needed amount of carbon. Bessemer discovered the process in 1855, and invented machinery that made it a commercial success. Mushet perfected the process chemically. The operation is performed in a pear-shaped pot, the converter, commonly 15 feet high by eight across, which since 1858 has but slightly changed its form. It is made of boiler-plate and lined with refractory material. When the iron turns white, it has become steel, and is poured out and worked. Bessemer steel lacks sufficient hardness for every purpose. Steel for hammers, knives, springs and a thousand finer articles, must be made by slower and more careful methods. Hence it is manufactured on the open hearths of flame or reverbatory furnaces by melting cast-iron, scrap-iron and wrought-iron together. In reliability and uniformness openhearth steel surpasses bessemer, but bessemer is the steel for engineers and builders.

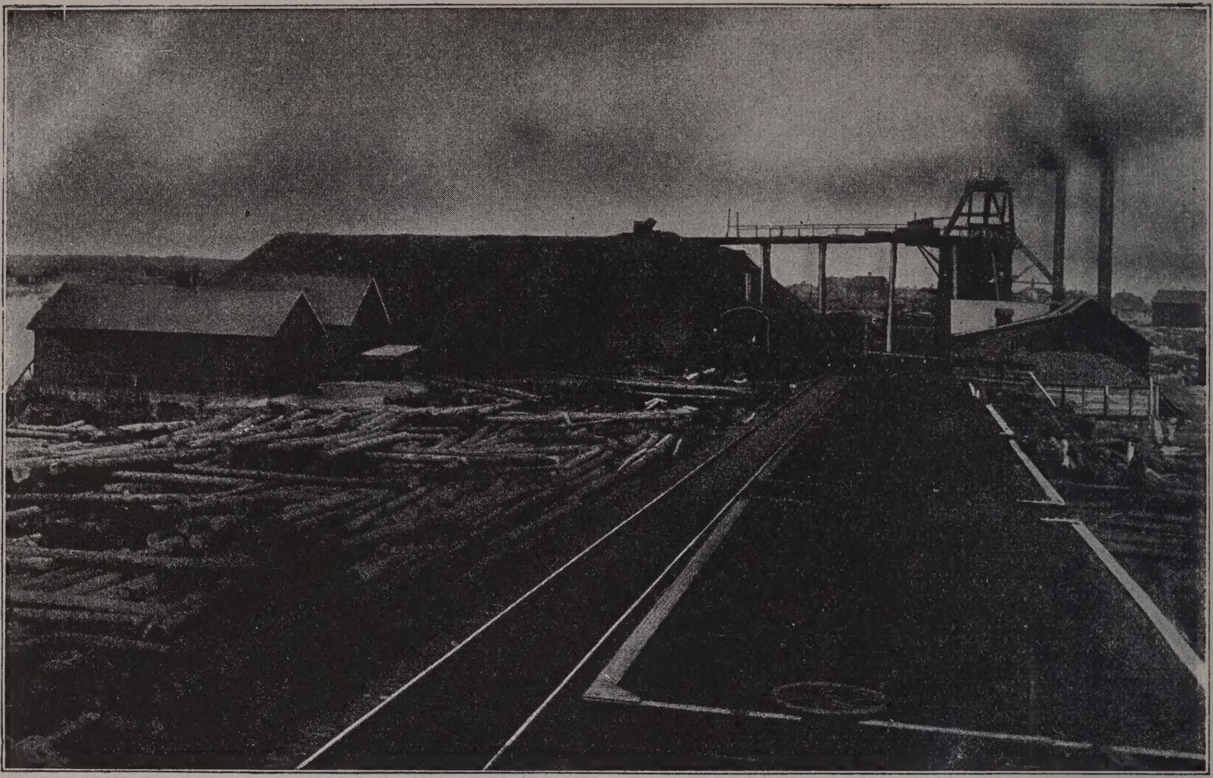
Owing to cheaper production steel has largely superseded brick, stone and wood in bridges and great buildings and wholly in the larger ships. Pittsburgh began about 1885 to produce beams, girders and other structural shapes; in 1892 production by automatic machinery displaced production by men; and American cities have since been rebuilt in steel. Barrels, bathtubs and furniture are now made of steel, as are cars, cotton-bands, roadways, sleepers and ties. Corrugated sheet-steel replaces wooden siding in buildings; expanded steel, a mesh of ribboney laths; ornamental steel-ceilings, plaster. Steel-frame churches have been erected, and New York's subway is a steel-tube.

No industry equals that of iron and steel in numbers, organization and wealth. America in its 5,370 establishments, produces nearly half the steel of the world. Pittsburgh makes more iron and steel than Great Britain, Chicago ranking second and making a third of our rails. The total value of the industry, whose movement is toward the lakes, is two billion dollars.

Though steelmaking has been revolutionized, vaster changes impend. The rolling-mill will become even more automatic. The important problems are the improvement of the quality of steel and the protection of workmen. The Bessemer converter is being replaced by the open hearth. A process has been invented, the duplex, that combines the pneumatic and openhearth methods. Less and less coal is needed in ironmaking, while oil, gas and electricity supply additional fuels or new processes and means. Highclass steel said to equal crucible-steel has been made directly from iron *ore* by an electric process. Finally, since dry air produces a hotter fire, with less fuel, than damp air, a process has been invented that takes the moisture, no small item. from air blown into the furnace, and the process increases production nearly a fifth.

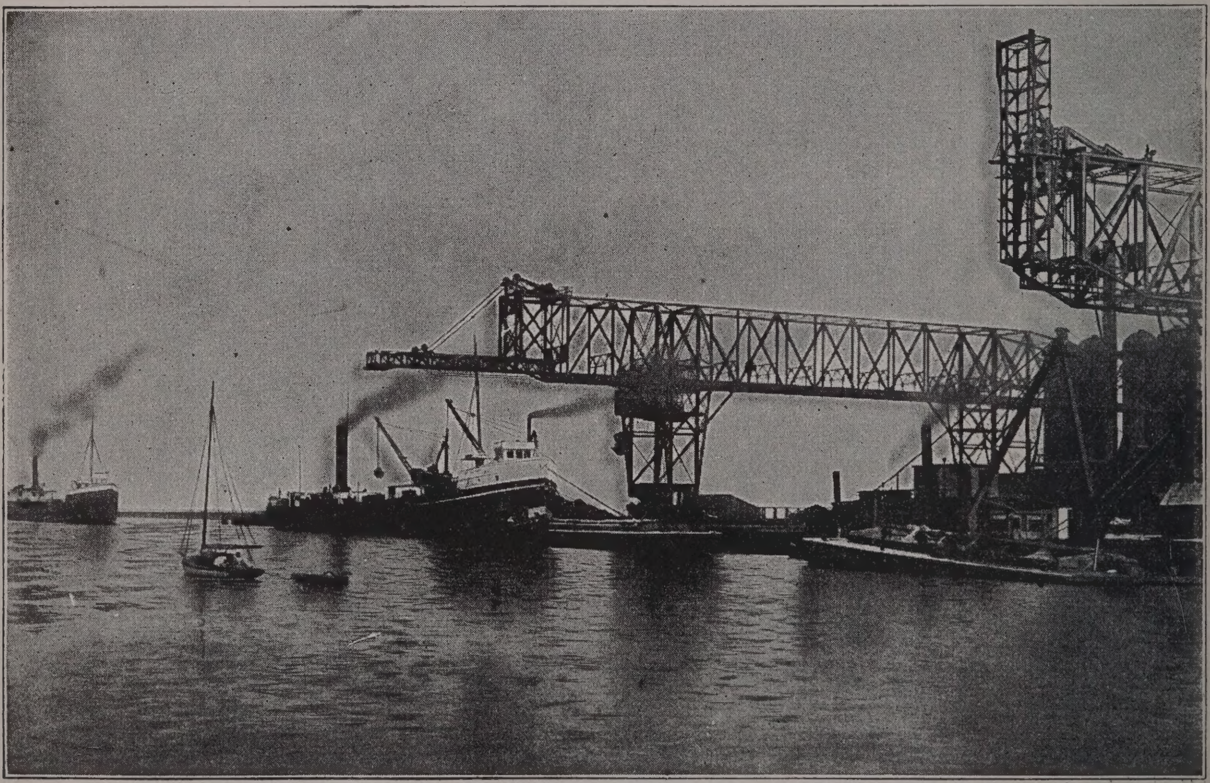
Steel-Build'ing-Construc'tion, a method of constructing tall city-buildings by building a framework of steel to carry floors and floor-loads, and walling this framework in with a wall of light brick or stone work. These buildings differ from the older buildings in that the masonry walls do not carry the loads of the building. They really are an application of the method of the steel-bridge to architecture. The office-buildings of Chicago, New York and other American cities are the best examples of this new architectural method. Among the tallest of these buildings are the Metropolitan Life-Insurance Building, New York City, 46 stories or 657 feet in height; the Singer Building, 41 stories or 612 ft. 1 in. high: and *The Times Building*, 28 stories or 419 ft. 9 in. high.

Steele, Sir Richard, a British author, was born at Dublin, Ireland, in March, 1672. He studied at Oxford, but in 1694 suddenly enlisted in a troop of horse-guards. His pamphlet known as *The Christian Hero* was published in 1701, followed by very different work in the shape of three plays, *Grief à la Mode*, *The Lying Lover* and *The Tender Husband*. In 1706 he received a court appointment under Queen Anne and the post of gazetteer, with a salary of $1,500, which, with two wealthy marriages, one in 1705 and the other in 1707, gave him ample means. Dissipation, however, kept him in



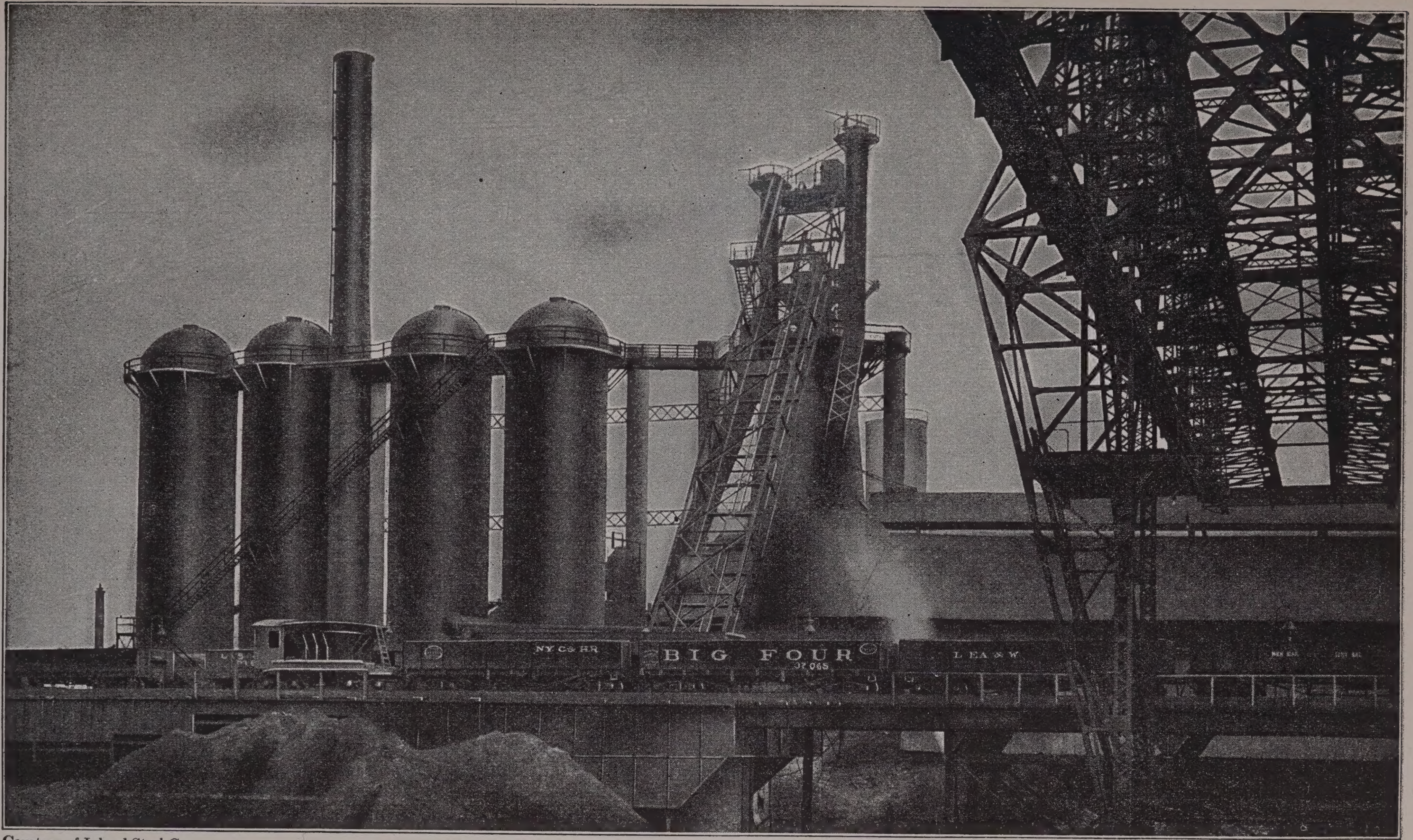
Courtesy of Inland Steel Co.

THE ORE—This picture shows a pile of iron ore at a mine in the Mesaba country in Northeastern Minnesota. This region is noted as containing the greatest iron-ore deposit thus far discovered in the world, and also because the ore is near the surface and easily mined. There are several hundred thousand tons of ore in that pile awaiting shipment. Appliances for loading are so perfect that the train of forty cars which you see standing there can be loaded in a few hours.



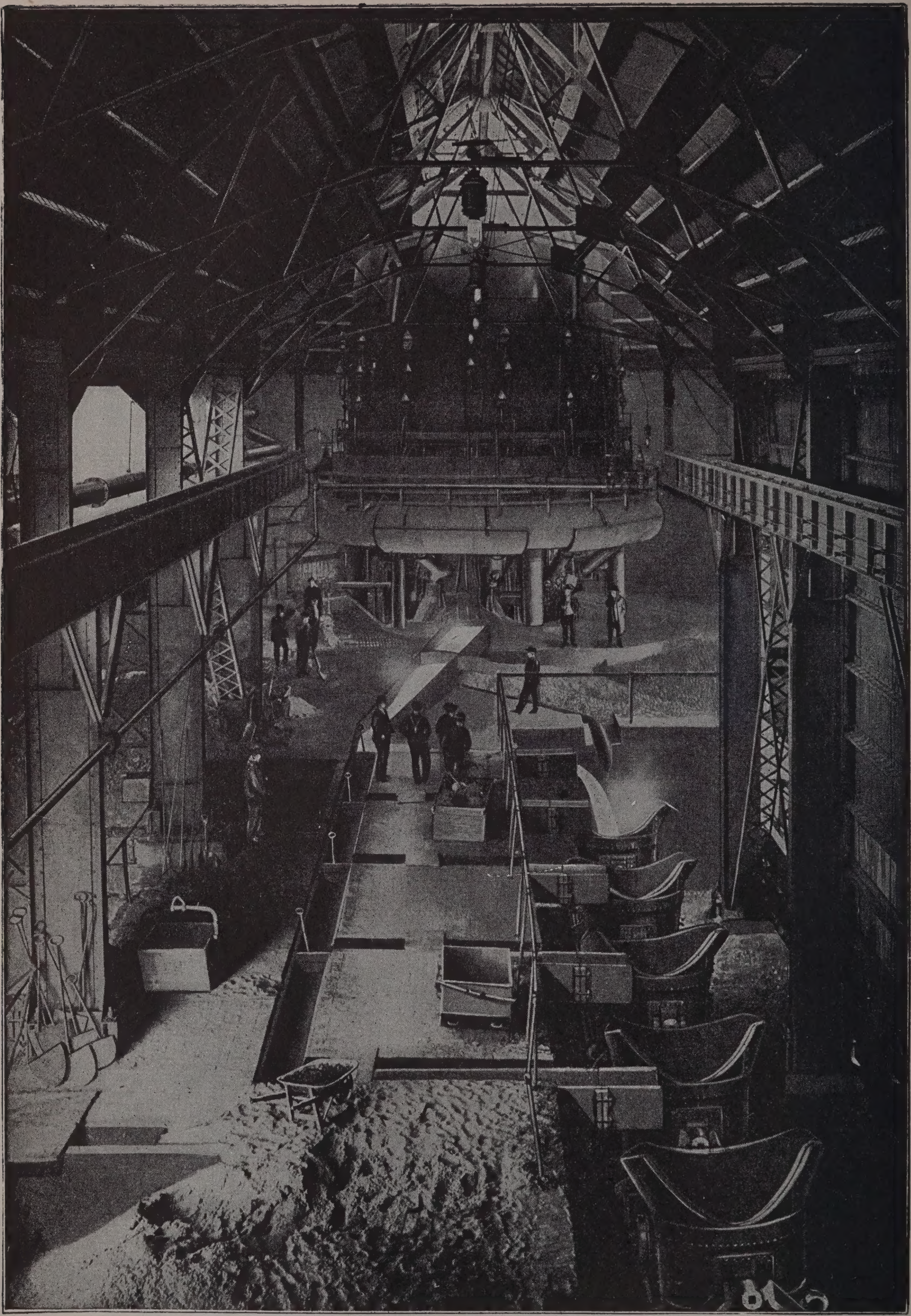
Courtesy of Inland Steel Co.

TRANSPORTATION TO THE MILLS—Then comes a run at high speed to the head of Lake Superior, only sixty-five miles away ending at the world-famous ore docks. Here a pull of a lever opens the hopper gates of each car; and the whole train can be unloaded in two minutes. The ore is run through the "pockets" of the ore dock into the hold of a great ore steamship, five thousand tons of ore being loaded in thirty minutes. The vessel carries the ore to the ore docks of the great steel mills to which it is consigned. The picture shows a great steel steamer as long as a city block unloading at the docks of the Inland Co., at Indiana Harbor, near Chicago. Here by machinery "grab buckets" are lowered into the hold of the ship; instantly each bucket grabs about seven tons of ore and is whirled upward to the bridge above. Thus ten thousand tons of ore are unloaded at this dock in a single day.



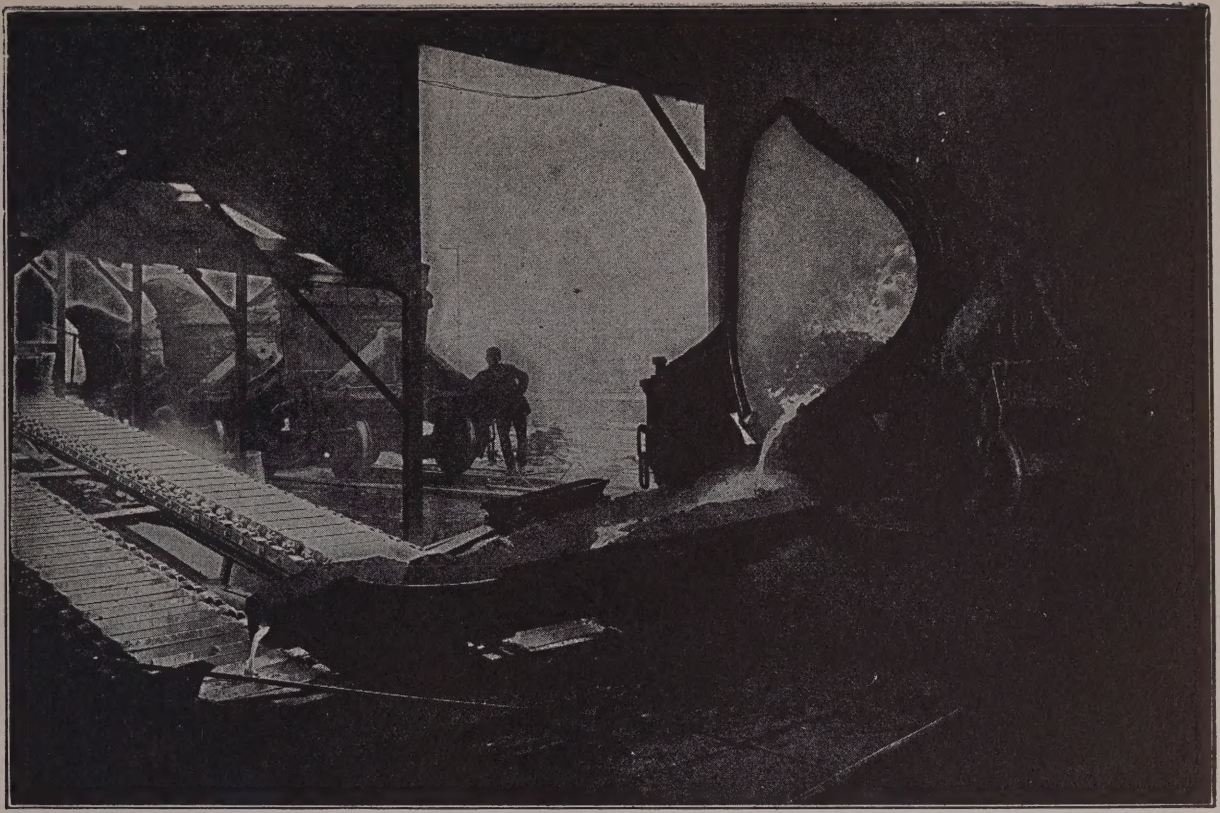
Courtesy of Inland Steel Co.

SMELTING THE ORE.—The first process is melting the ore in a blast furnace, in order that the iron may be separated from the earthy matter. This is called smelting. A blast furnace is a huge retort built from fire brick, inside a heavy steel jacket. In the picture you see the blast furnace behind the inclined railroad. It is 85 feet high. It is charged by dumping into it first a charge of coke, next a charge of limestone, to act as a *flux* that is to make the ore melt and flow more quickly, and then several tons of ore. The combustion of the coke is aided by a fierce blast of hot air which is forced through it securing a heat of 3000°, which is necessary to melt the ore. The white hot liquid iron sinks to the bottom and is drawn off; the impurities pass off in slag and gases. Every twelve minutes, day and night, a charge is made by means of steel "skip cars" which run up the inclined railroad and dump their loads into the top of the blast furnace. The four tall steel tanks on the left in the picture are called stoves and are filled with a checker work of fire brick. Waste gas from the top of the blast furnace is carried into these stoves and furnishes a heat which brings the fire brick to a white heat. The gas is switched off, and cold air forced through is heated to 1000° by the white hot brick. It is then driven to the hearth of the blast furnace and assists in reducing the ore.



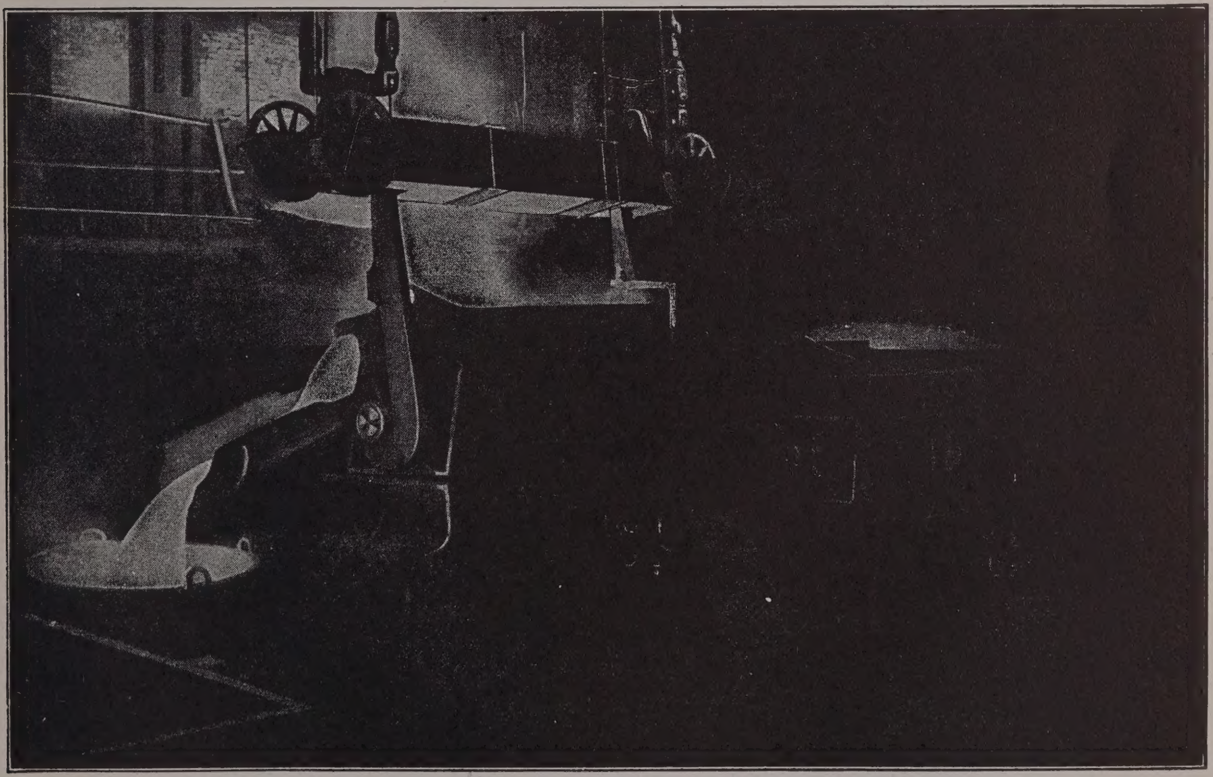
Courtesy of Inland Steel Co.

TAPPING THE BLAST FURNACE—In this picture we see the lower part of the great blast furnace The white hot liquid iron sinks to the bottom and, freed from the slag, it is tapped and flows out, as you see in the picture, and is carried into huge brick-lined ladles. Each ladle holds twenty-five tons. Each ladle sits on its own little car and the whole train load is filled at one heat. This train is run direct either to the open hearth furnace or to the pig-casting machines.



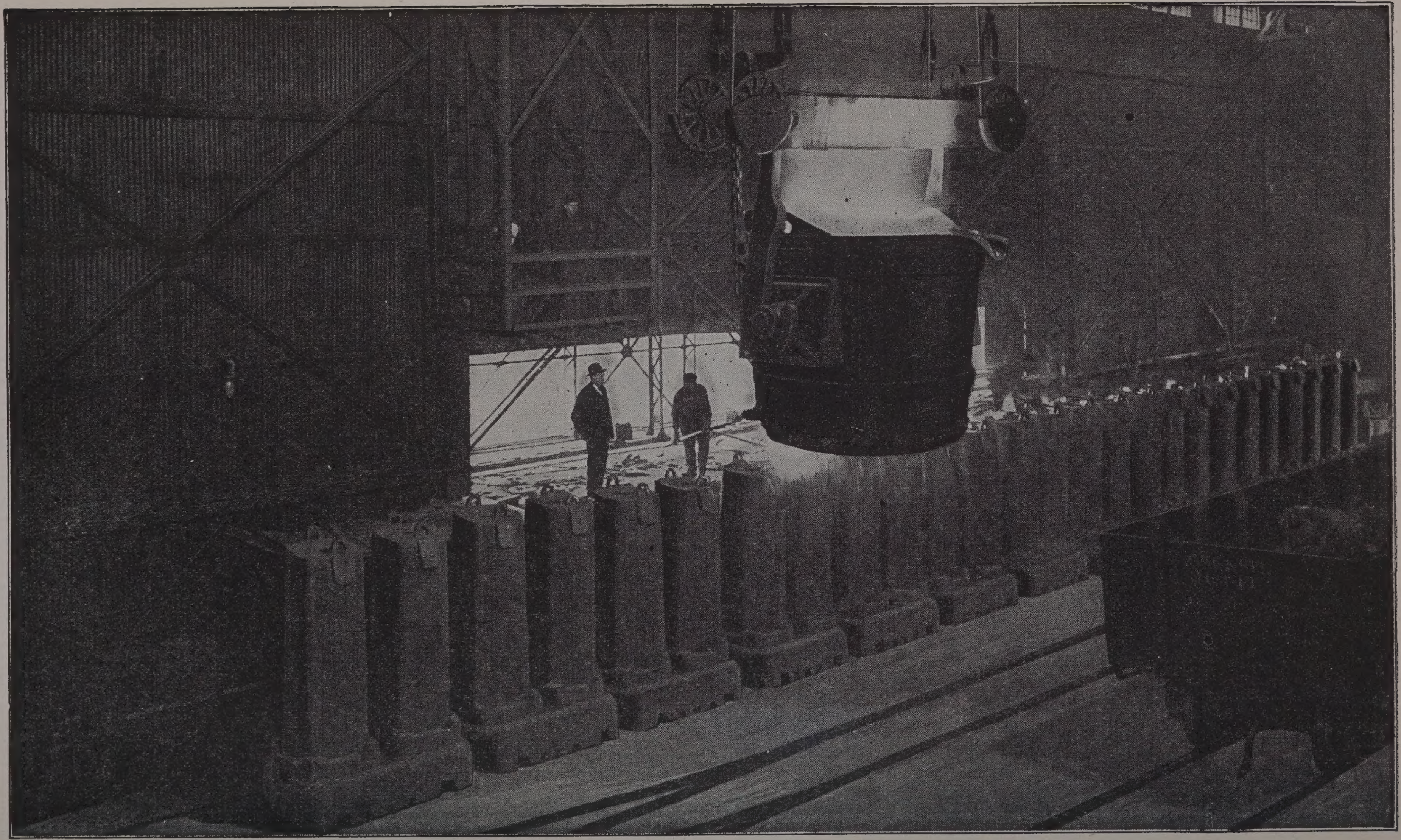
Courtesy of Inland Steel Co.

THE PIG IRON CASTING MACHINE—By the old way of making pig iron, it was run out of the furnace mouth into a series of long canals in a sand bed and from these canals into little laterals, where it cooled in "pigs." This method is now displaced by the pig-casting machine. It is a long endless belt with steel buckets on it, each bucket being a mold for a 100-pound pig of iron. As we see in the picture, the ladle car is brought to the casting house, the ladle dumped by electricity, and the molten iron runs through a trough into a moving bucket conveyor. As the buckets move upon a 200-foot incline the molds are drenched in a flood of cold water. At the upper end the pigs are dropped into a car which is flooded with water, to keep it from catching on fire. Pig iron thus cooled is dumped onto a stock pile to be carried to the open hearth furnace when needed.



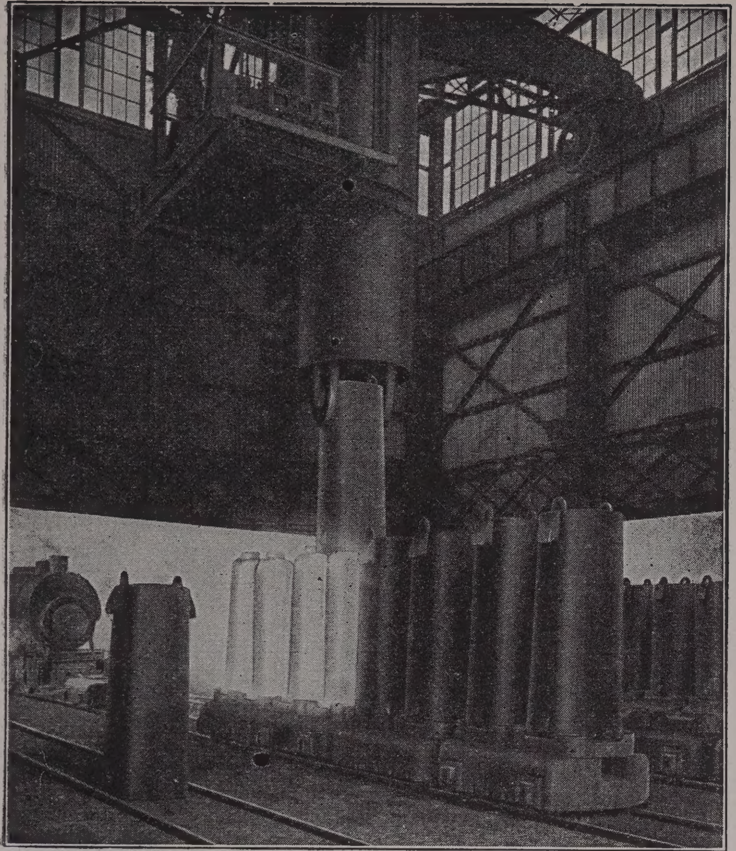
Courtesy of Inland Steel Co.

THE POURING SIDE OF OPEN HEARTH FURNACES—Instead of making into pigs as above described, the molten iron is generally carried in the ladles, direct to the Open Hearth Furnaces. On one side of the row of furnaces is the charging floor. A huge overhead charging machine travels the length of it. A quantity of limestone is spread on the floor of the furnace, then come the ladles carrying the seething mass of red hot iron from the blast furnace. The lower door of the furnace is closed and this molten mass is poured in through an upper door provided for the purpose. In this furiously hot furnace, which reaches 4000 degrees of heat, the iron ore is freed from its carbon, phosphorus and sulphur. Then, since steel must have carbon in it, just the right amount of carbon is added to the melt.



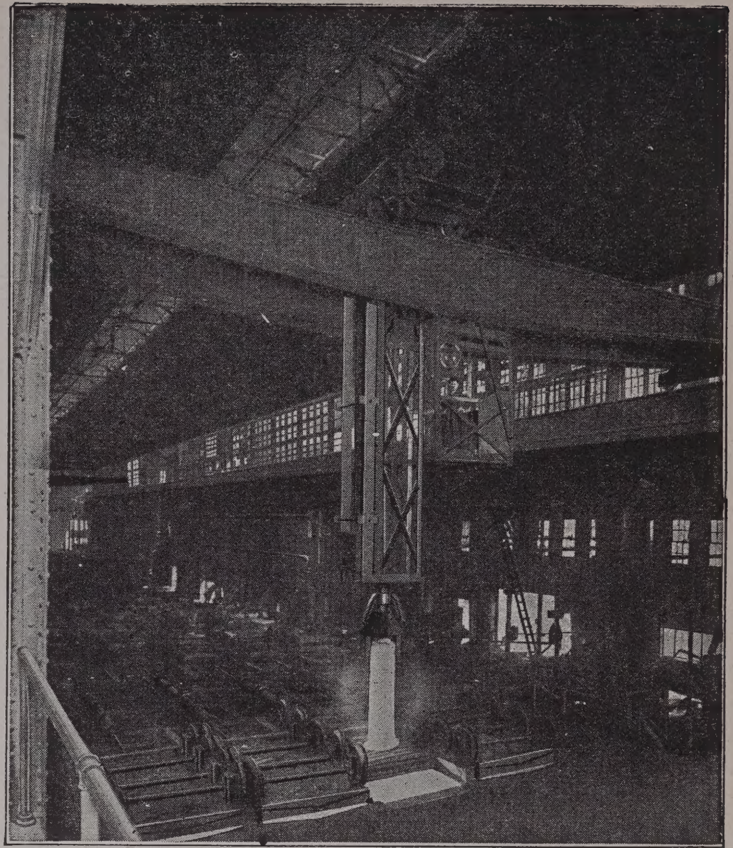
Courtesy of Inland Steel Co.

POURING THE INGOTS—When this open hearth steel is done to a turn, it is drawn off into a huge ladle suspended from the overhead traveling crane. The ladle then moves along the row of ingot molds which you see in this picture. A small trap at the bottom of the ladle is opened and one after another of these ingot molds is filled with the molten steel. The molds stand on waiting cars and when filled they are pulled into the yard where, after they have sufficiently cooled, they are run under the "stripper."



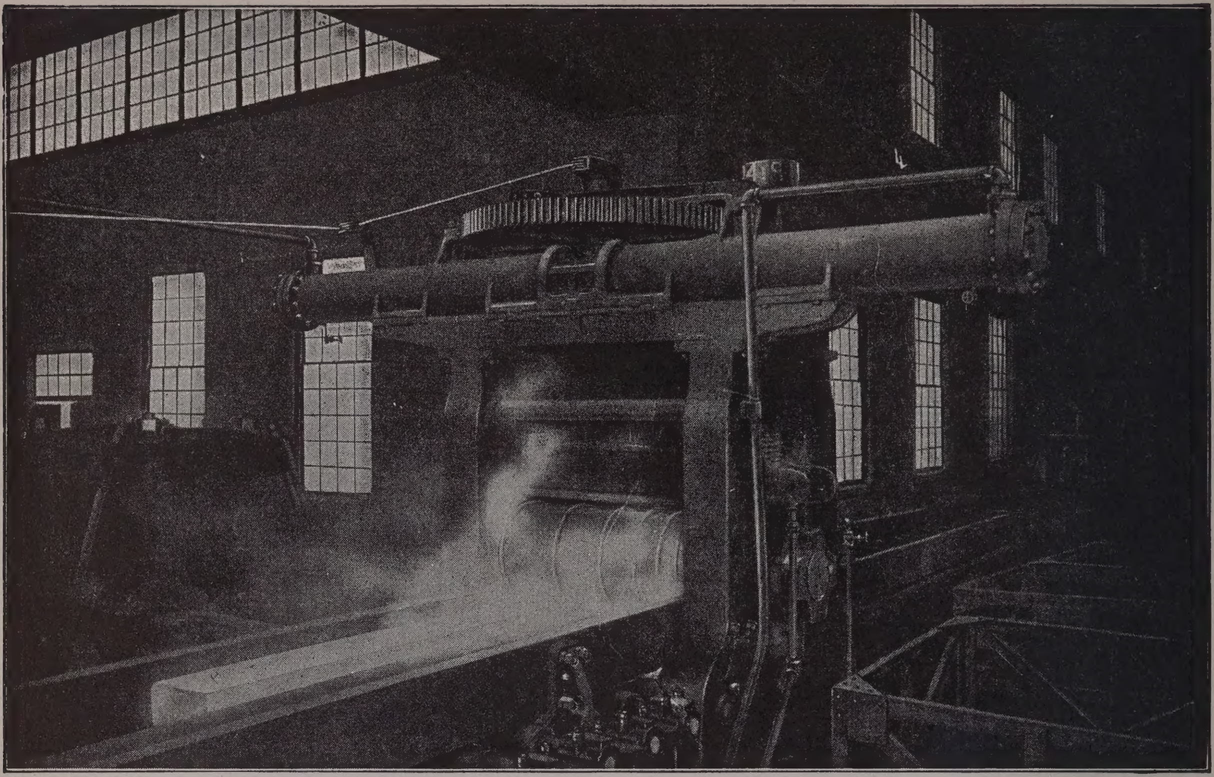
Courtesy of Inland Steel Co.

INGOT STRIPPER—The stripper is a powerful machine that pulls the mold off the ingot. Enormous steel grippers descend and grip the mold near the top, lifting it from the car. Then a steel ram descends and pushes the ingot out through the bottom of the mold, leaving it standing on end, still red hot, on the car, passing on to the next mold till the whole row stands stripped and glowing.



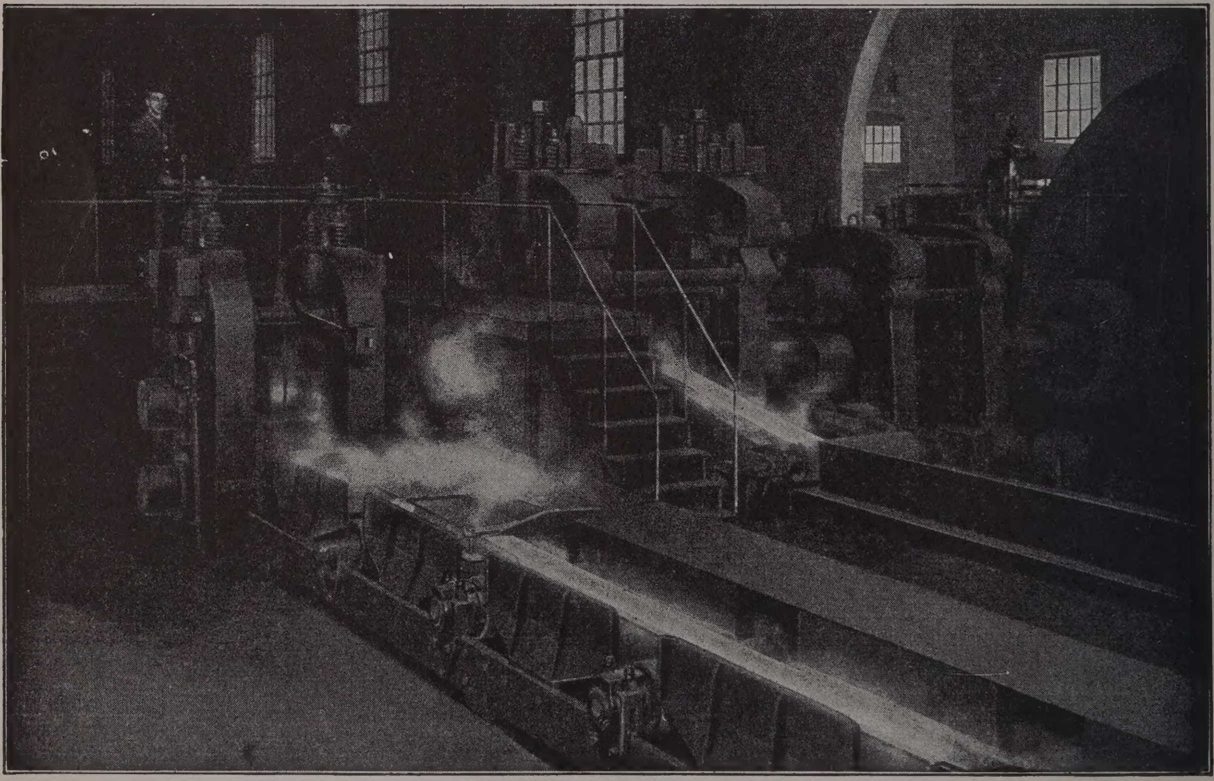
LOWERING AN INGOT INTO THE ''SOAKING PIT''

The train of red hot ingots goes on its journey into the rolling mill. Here is a row of ''Soaking Pits'' sunk into the ground. They are made of fire brick and heated to a white heat. An overhead crane grapples an ingot from its car and lowers it into the soaking pit. This operation is repeated until each of the pits has its full load of ingots in soak Here the ingots are brought to a white heat and when ready are lifted out and swung over onto the table of the blooming-mill.



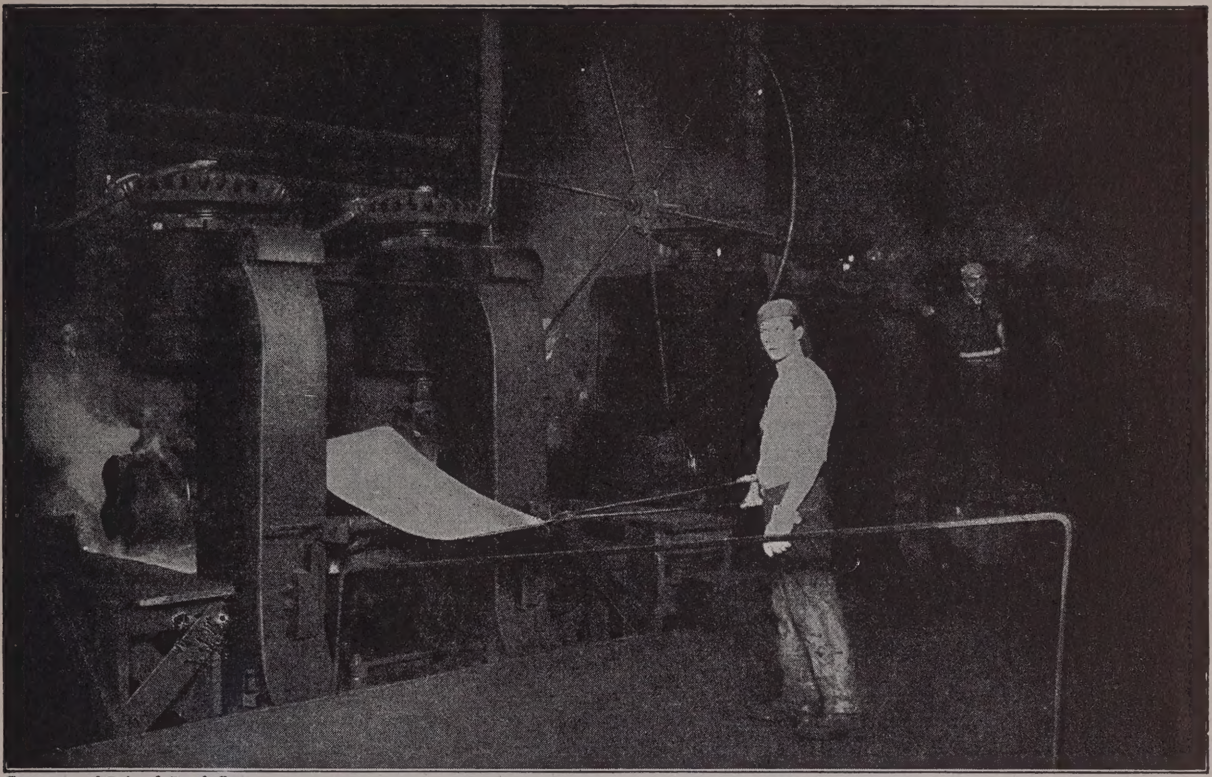
Courtesy of Inland Steel Co.

THE BLOOMING-MILL—The blooming-mill is a big, noisy machine for changing the ingots into shapes required In the center are huge steel rolls revolving towards each other Leading to this is a long train of smaller rollers driven at a rapid rate. The instant an ingot is laid on the far end of the table, it is carried to the jaws of the grooved rolls. When it strikes them there is a crash like a cannon shot and the ingot is forced through the rolls and comes out thinner and longer than before. Back again it goes through a smaller groove in the same rolls. Thus it passes back and forth, each time through a smaller groove until it is reduced to a long, flat slab



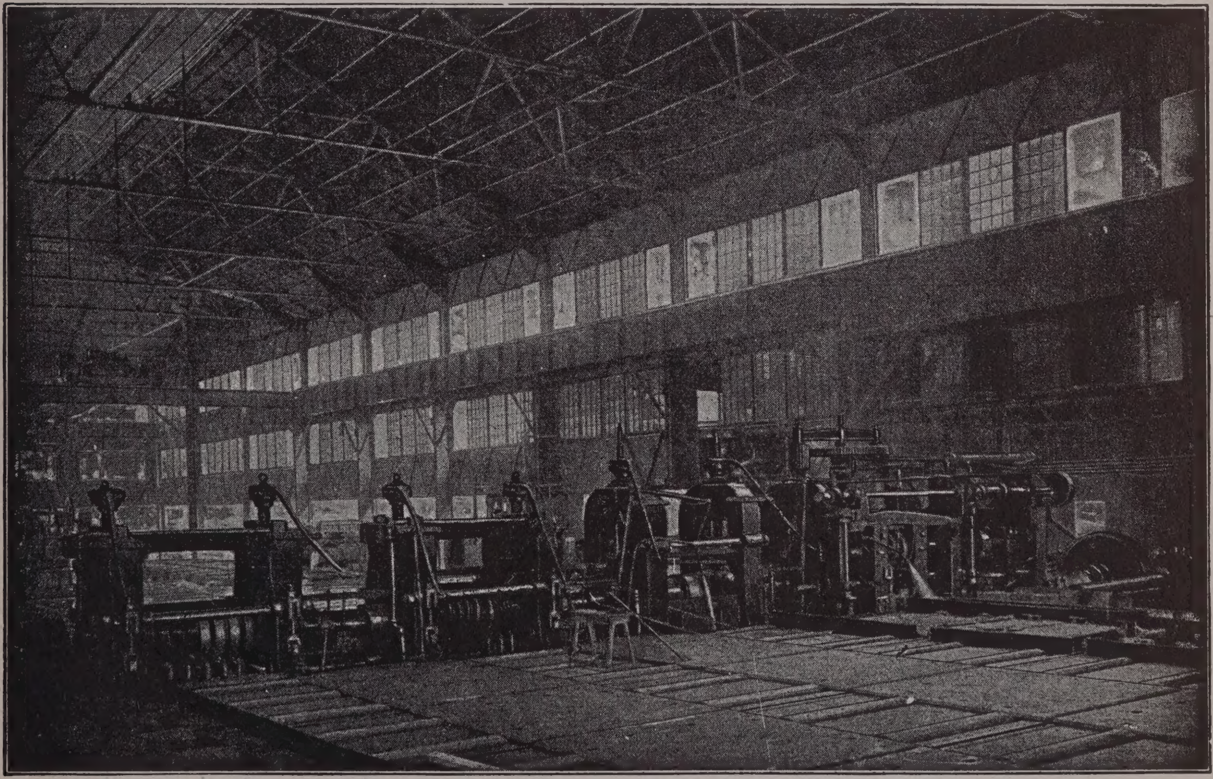
Courtesy of Inland Steel Co.

SHEET STEEL—If sheet steel it to be made, the slabs pass to the table of the sheet bar mill. The same operation as in the blooming-mill is here repeated, though on a smaller scale and the resulting sheet bar is a long snake-like strip of steel. This red hot sheet bar travels onward to the saw which cuts it into 30-feet lengths.



Courtesy of Inland Steel Co.

FIRST ROLLING OUT OF THE SHEET—The sheet-bars are loaded into heating furnaces to be brought up to required heat for rolling. When ready the roller catches the sheet in his tongs and thrusts it between the rolls of his mill. Another worker catches it with tongs and passes it back, and thus it is shot back and forth until it is squeezed into a thin long sheet.



Courtesy of Inland Steel Co.

ROLLING MILL—Here we have a general view of the rolling mill, showing machines for rolling steel into all the many forms required.

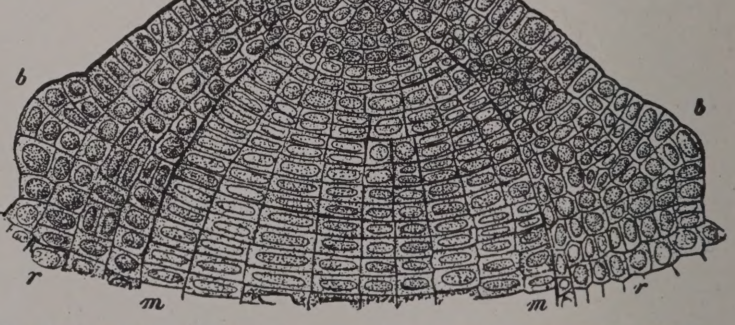
pecuniary trouble most of the time, his life being spent, as he says, "in sinning and repenting." On April 12, 1709, appeared the first number of the famous *Tatler*, a tri-weekly paper, which was followed in March, 1710, by the more famous *Spectator*, in turn succeeded in March, 1713, by the *Guardian*. Addison (*q. v.*) a friend and schoolmate of Steele, was his valued and valuable assistant in all these enterprises; as he said: "I fared like a distressed prince who calls in a powerful neighbor to his aid; I was undone by my auxiliary; when I had once called him in, I could not subsist without dependence on him." The characters of Sir Roger de Coverley and Will Honeycomb are said to have been first suggested by Steele, and his fame rests mainly on the essays contributed to these papers. His political career in Parliament ended in impeachment and expulsion for what were considered treasonable writings in *The Crisis*, a pamphlet published by him in 1717 and answered by Swift. He again entered Parliament after the death of Queen Anne, was knighted by George I, and in 1722 published his best comedy, *The Conscious Lovers*. He died on Sept. 1, 1729. See *Memoir* by Austin Dobson, in the English Worthies Series; and *Life* by Aitken.

Steel'ton, Pa., a borough of Dauphin County, on Susquehanna River and the Pennsylvania Canal, three miles southeast of Harrisburg, with which it is connected by electric railway. Here is the large plant of the Pennsylvania Steel Company, engaged in the manufacture of Bessemer steel, for rail, bridge and construction works. It has, besides, saw, planing and flour mills. It is served by the Pennsylvania and Reading railroads. It has a number of churches, schools, banks, and other public buildings. Population 14,246

Stein (*stīn*), **Heinrich Friedrich Karl,** Baron **von,** a Prussian statesman, was born at Nassau, Germany, Oct. 26, 1757. He entered the service of Prussia in 1780, and in four years was head of the mines in Westphalia. He was called in 1804 to be head of the department that controlled customs, taxes and trade, but being unable to work with the king he resigned in 1807, while in retirement writing an essay on political reform. Before the year was ended, however, Frederick William III had to recall him, and in less than a year Stein carried out the measures he had planned, which laid the foundation of Prussia's greatness. He abolished the remains of serfdom, did away with privileged classes and all monopolies, and supported the army reforms. But Napoleon, who had advised his recall, now fearing him, insisted upon his dismissal, and in 1808 he withdrew to Austria and finally to Russia, after having issued his *Political Testament*. He was influential in forming the union against Napoleon. He died in Westphalia, June 29, 1831. See *Life and Times of Stein* by Seeley.

Steinmetz, Charles Proteus, born in Breslau, Germany, 1865; educated in Breslau, Berlin, and Zurich, Switzerland. At first denied admission to United States as penniless cripple; soon admitted. He joined the engineering force of the General Electric Company in 1893; became head of the consulting engineering department. He devoted himself to pure science in electricity. Was professor of electrophysics at Union College from 1902. Dr. Steinmetz worked during his life without a salary, only requiring a drawing account to supply his needs. He invented the lightning generator, designed the electric automobile, contributed much to the advancement of electrical science, writing many articles thereon. He died in 1923.

Stelvio (*stĕl'vē-ō*), **Pass of,** is the highest carriage-road across the Alps, remarkable for its beautiful scenery. It is 9,042 feet above the sea, 33 miles long, and forms part of the great road between Milan and Innsbruck.



Vertical section of stem tip, showing growing point (*s*), forming leaves (*b*), cortex (*r*), and central cylinder (*m*), in which the woody bundles are to appear.

Stem. In general, the axis part of a differentiated shoot, and in this sense it includes the shoot axis of mosses and leafy liverworts. Its special application, however, is among fern-plants and seed-plants, in which group the vascular system is developed. In structure there are several distinct types of stems, but they are all developed in the same general way. At the growing tip of the stem there is a single cell (most *Pteridophytes*) or a group of cells (some *Pteridophytes* and all *Spermatophytes*) known as the apical cell or cells. These apical cells are meristematic, and by their division organize the two or three great regions of the stem. In the stem of an ordinary seed-plant the three embryonic regions, beginning at the outside, are the dermatogen, periblem and plerome (see all three). The dermatogen gives to the epidermis, the periblem to the cortex, and the plerome to the stele. The chief differences among stems consist in the various organizations of the vascular or woody tissues in the stele. For example, in the *Gymnosperms* and *Dicotyledons* the woody bundles are organized into a hollow cylinder, within which is a definite pith; while in the *Monocotyledons* the woody bundles are scattered in the stele. The usual function of stems is to display foliage leaves; but sometimes they become much modified, especially when subterranean. In this case they are usually used for the storage of reserve food, and become variously thickened and distorted, being called tubers, rootstocks (rhizomes) etc.

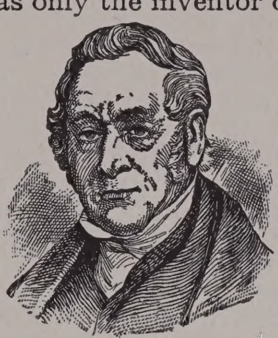
Stephen (*stē'ven*), the first Christian martyr, was one of the first seven deacons chosen by the church at Jerusalem at the instance of the Apostles. (*Acts vi.*) He was a popular preacher who grasped the meaning of the great revolution which Christianity had brought into the Mosaic institutions. He was accused of blasphemy, and, before he could finish a speech in his own defense, was hurried outside the city-walls and stoned to death, while praying for his accusers. (*Acts vii:* 60.) He is celebrated in the Roman and Anglican churches on December 26th, in the Greek church on the 27th.

Stephen, king of England, was born at Blois in 1105. He was the grandson of William the Conqueror and nephew of Henry I of England. On the death of Henry Stephen claimed the throne, though he had taken the oath of allegiance to his cousin Matilda, on whom Henry I had settled the succession. He was crowned on Dec 26, 1135, but never received the confidence of his people. The kingdom was badly governed, the nobles and clergy were against him, and he had to struggle with Matilda for the throne. In 1141 Stephen was taken prisoner and Matilda acknowledged queen. He was exchanged for Robert of Gloucester, the queen's brother. The queen left England, and Stephen reigned quietly until 1152. Henry, the son of Matilda, then contested the throne and the long struggle ended in Stephen making Henry his heir. King Stephen died at Dover, October 25, 1154.

Stephens, Alexander H., an American statesman, was born in Georgia in 1812. He was a member of Congress from 1843 to 1856. He was opposed to secession and made a speech against it before the legislature of Georgia in November, 1860, and, when a delegate to the secession convention at Milledgeville in January, 1861, voted against the ordinance of secession. He was, however, elected vice-president of the Confederacy, and was one of the prominent statesmen of the seceding states. He was imprisoned at Fort Warren in Boston harbor for five months at the close of the war. He was in Congress from 1874 to 1882, when he was elected governor of Georgia. He died at Atlanta, Ga., March 4, 1883. In 1867-70 he published *A Constitutional View of the War between the States.* See *Life* by Cleveland.

Stephens, James. See Fenians, England, Great Britain and Ireland.

Ste'phenson, George, is usually spoken of as only the inventor of the locomotive, with the implication that it required no extraordinary genius to adapt the stationary engine of Watt to the work of locomotion. That is not true. There were difficulties to overcome that scientific men long thought to be insuperable — the direct transmission of power to the wheels and the securing of sufficient friction between wheels and rail to prevent slipping. The fact that Stephenson also invented the rail and roadbed and initiated the entire system of civil engineering as applied to railroad-building is commonly overlooked to-day. During his life the two achievements were inseparable and equally honored, as they should continue to be. Without the properly constructed, level road-bed, laid with iron rails, the locomotive must long have remained of limited use.



GEORGE STEPHENSON

Of all the great inventors Arkwright alone had as humble a beginning as Stephenson. To be born the son of a fireman of a colliery's pumping-engine, whose earnings never exceeded three dollars (12 shillings) a week, would seem to condemn one to a life of poverty, ignorance and obscure toil. It was on the 9th of June, 1781, that George Stephenson was born in the wretched mining-village of Wylam, near Newcastle, England. One room in a cottage, near the pit-mouth, that sheltered three other families was the home of his parents and six children. School was not to be thought of; bread was not always to be had in sufficent quantity. In this grimy village he spent his babyhood; childhood saw him below ground. At 14 he was promoted to be his father's assistant at a shilling a day. At 17 he himself was an engineman at two shillings, with his father under him as fireman. He began at once to study his steam-pump. Every idle day he spent in taking it to pieces, cleaning and repairing it. Eager to add to his knowledge of engines and steam he hired a poor schoolmaster to teach him to read. He soon raised himself to manager of the hoisting-engine at the pit-mouth. Thorough preparation and one step at a time marked his entire life. At 23 he was in charge of a Watt-engine in a spinning-mill. At 32 he was earning $500 a year, and the first use he made of it was to put his son Robert to school. At night he continued his own education under the boy's instruction. Father and son read, drew, modeled and experimented in physics together.

About this time a locomotive having a toothed wheel to grip a toothed rail was installed in a neighboring colliery. Stephenson thought a smooth wheel would run on a fairly level road, the weight of the engine supplying the necessary friction. In 1815 he patented his first model in which, in addition to the smooth wheel, he incorporated the principles of high steam-pressure by using the waste steam as a blast. He also secured simple and direct transmission of power to the wheels and joint-action of all with the connecting-rod. The multitubular boiler, so as to expose a larger surface to the fire, was added later. Having invented the locomotive, he had next to train workmen, as did Watt, to make it properly. Above all, he had to find a partner to supply the money. Next he turned his attention to the railroad. Long experiments were necessary before the first wrought-iron rail was laid with specially invented joints. The next difficulty was the securing of a level road-bed. The first railroad he built was one of eight miles in length for a colliery. Stationary engines were used to pull the loaded cars up steep gradients. In descending the cars ran by gravity and pulled empty cars up a parallel track. In 1825 Stephenson built his second short railway for a colliery district, attained a speed of 15 miles an hour on level stretches, and started a factory for building locomotives. Then came the first passenger-and-freight line between Liverpool and Manchester and the first attempt at modern railway engineering The work involved carrying the line across Chat Moss, a stretch of bog-land, making a deep cut through the red sandstone of Olive Mount and tunnelling under Liverpool for a mile and a half. In this work Stephenson displayed a resolution, a resourcefulness and an ability to control men and initiate methods then unheard of in modern life. The line was opened in 1830, with eight of Stephenson's engines of the *Rocket* type in the procession. His work called forth the most extravagant praise and wonder. It was compared in magnitude and difficulty with the work of ancient Egypt and Babylon. Yet this was only a beginning. Forty-nine years old at the time of the opening of the Liverpool and Manchester Line, Stephenson continued to build roads and locomotives and to improve them and to overcome greater engineering difficulties for the next 15 years. His surplus wealth and leisure he employed in developing coal-mines, burning lime and managing a large country-estate. He made flying trips to Europe to lay out the first lines in Belgium and Spain. He bridged Menai Straits at Holyhead, Anglesey, and carried a railroad across. He lived to see his son succeed him worthily. He died on August 12, 1848, honored as much for his character as for the benefits he conferred. Consult *Life*, in *Heroes of Science*, by T. C. Lewis and *Life* (revised edition) by Smiles in Volume III of *Lives of Engineers*.

Stephenson, Robert, the son of George Stephenson, was born near Newcastle-upon-Tyne, England, Oct. 16, 1803. He helped his father in the survey of his first railroad and spent three years as civil engineer in South America. On his return he had charge of his father's locomotive-works and assisted in building the famous *Rocket*, which won the prize as the best engine at the opening of the first passenger railroad in England. He was his father's assistant in all the railroad-building that followed and rose to the highest rank in his profession. Among his great works are Britannia and Conway tubular bridges, the Victoria bridge at Montreal and two bridges across the Nile at Damietta. He was a member of Parliament, received many honors from abroad, and at his death, Oct. 12, 1859, was buried in Westminster Abbey. See *Lives of Engineers, Volume Five*, by Smiles and *Life of Robert Stephenson* by Jeaffreson.

Stereopticon (*stĕ′rē-ŏp′tĭ-kŏn*). See MAGIC-LANTERN.

Ste′reoscope, an instrument which combines two different pictures of the same object into one, making it appear solid. Two photographs are taken of the object, one as it appears when looked at with the right eye and the other as it looks with the left. These are transposed, that is, the right picture placed on the left and vice versa, mounted, and introduced into an instrument having a double lens or a single lens cut in two, which makes the two images blend into one and stand out as they seem to when looked at by the eye alone. The lenses act as magnifying glasses, and also incline toward each other, which helps to blend the pictures The stereoscope was first invented in 1838 by Sir Charles Wheatstone. See *Stereoscope* by Brewster.

Ste′reoty′ping is the art of making solid casts of pages of movable type, to be used in printing. When the pages of matter to be printed are ready for the press, casts are taken from them, either in type-metal or in copper. Type-metal, which is used in stereotyping, is an alloy of lead, antimony, tin and, sometimes, copper, and is much cheaper than copper, which, however, is the more durable and so is used where large numbers are to be printed. Taking the casts of the printed sheets in copper is called electrotyping (which see). Stereotyping was invented by William Ged, an Edinburgh goldsmith, about 1725. A cast is first made by pouring a mixture of plaster of paris and water over the types and, when it is hardened or set, taking it off and drying it in an oven. This cast, which is a perfect copy of the page to be printed, is dipped into the melted type-metal, forming a cast of the metal, which is trimmed and planed to fit the block on which it is to be mounted. This cast is called a stereotype plate. The process used now is the invention of Genoux in 1829, called the *papier maché* process. It is much cheaper and more rapid, and has come into general use. Folds of soft, thin paper, pasted together and wet, are laid on the face of the type and beaten with a hard brush, so as to fit in all the holes in the type. The hollows made in this way on the outside of the paper are filled with clay and brown paper pasted over, and the whole is dried till it can be lifted off the type, when the cast of type metal is made from it by pouring in the hot metal. The paper cast can be kept and any number of new casts made from it. In printing newspapers the stereotype plates are made to fit round a cylinder, and the paper is pressed into the holes of the type by a roller. In large newspaper-offices a cast can be made in three to five minutes. See *Stereotyping and Electrotyping* by Wilson.

Ster'ilizing Processes are intended to destroy the micro-organisms to which fermentations and often diseases are due. Louis Pasteur (see PASTEUR INSTITUTE) was the originator of the theory and practice of these processes. Milk is the chief food which needs to be sterilized, both for the wide range of its use and the nature of the diseases which it may help to convey, as consumption, typhoid fever, diarrhœa in children, scarlet fever and cholera. Milk may be pasteurized at a temperature of 167° F. Boiling and treatment with superheated steam are even surer methods. Freezing assists to sterilize milk; but is less sure. Water is most conveniently sterilized by boiling. There can be no doubt that sterilization is one of the great, general advantages of the process of *cooking* food. Chemicals ought not to be used in sterilizing processes; for it is necessary to employ them, if at all, in quantities too large for health.

Ster'ling, Ill., a city in Whiteside County, on Rock River and the Chic., Burl. and Quincy and Chic. and Northwestern railways, 110 miles west of Chicago. Among its public institutions it includes good schools and a well-equipped library. Its industries embrace machinery, hardware, agricultural implements, paper and flour mills, canned goods, watches, caskets and a foundry. Population 10,000.

Stern'burg, Hermann von Speck, a German diplomat, born at Leeds, England, in 1852, and educated in Saxony and at Potsdam Military Academy. He took part in the Franco-Prussian War in the 2d Dragoons of Saxony, and in 1890 was drawn to official life, first as secretary of the legation at Peking, and secondly as *chargé-d'affaires* at Belgrade, Servia, and then as first-secretary of the embassy at Washington, D. C.; subsequently becoming envoy extraordinary to the United States in 1903 and, in the same year, ambassador. In 1898 he acted on the Samoan Commission, and in 1900 was consul-general for British India and Ceylon. He died in 1908.

Sterne, Laurence, a British writer, was born at Clonmel, Ireland, Nov. 24, 1713. He studied at Cambridge and became a clergyman. In 1759 he wrote the first two volumes of the *Life and Opinions of Tristram Shandy*, which has made him forever famous. Its success was signal and he became the "lion" of the fashionable world. The other two volumes followed in the same year and were as heartily welcomed as the earlier ones. The remainder of the work, which reached nine volumes, was written at Coxwold, where he had moved from his Yorkshire parish. *A Sentimental Journey through France and Italy*, published in 1768, was the result of a tour through those countries in 1765. He also published two volumes of sermons. His fame rests on his humor and the immortal characters of Corporal Trim, Yorick and My Uncle Toby, found in *Tristram Shandy*. He died at London, March 18, 1768. See *Life* by Fitzgerald and *Sterne*, in the English Men of Letters Series, by Traill.

Stettin (*stĕt-tēn'*), a Prussian city, is the capital of Pomerania. It is on the Oder, 60 miles northeast of Berlin. The citadel and several forts which formed the ancient fortifications were removed in 1874. The churches of St. Peter (1124) and St. James, founded in the 14th century, the palace, town-hall, two ornamental arches and several fine squares are among the noticeable features. It is one of the chief seaports of Germany, and manufactures soap, matches, clothing, sugar, paper, sewing-machines and bricks; has oil-refineries; and engages extensively in shipbuilding. Stettin was the seat of a princely dynasty, 1107-1637; was occupied by Sweden, 1648-1720; and by the French, 1806-13. Population 236,145.

Steu'ben, Frederic William Augustus, Baron, a general in the Revolutionary War, was born at Magdeburg, Prussia, Nov. 15, 1730. He served when only 14 in the siege of Prague, and rose in the army until in 1752 he was on the staff of Frederick the Great. He came to America in 1778 and offered his services to Washington, who gladly accepted them, as it was in the dark days of Valley Forge. He was appointed inspector-general, and remodeled the army. He took part in the siege of Yorktown, and spent his whole fortune in clothing his men. Congress in 1790 voted him $2,400 yearly and a township of land near Utica. N. Y., where he died on Nov. 28, 1794. See *Life* by Kapp.

Steu'benville, O., a city, county-seat of Jefferson County, is on the Ohio, 68 miles below Pittsburgh, by rail 43 miles from Pittsburgh. It is in a rich farming-country, with large coal-mines and natural gas, and has a large trade. It stands high on the right bank of the river, is well laid-out, and has foundries, machine-shops, rolling-mills, tin and paper mills, blast-furnaces, boiler-works and factories of nails, glass, pottery and white lead. The city is built on the site of Fort Steuben, which was erected in 1787 and named after Baron Steuben. The permanent settlement was made in 1797. It is served by three railroads and three interurban lines. Population 35,000.

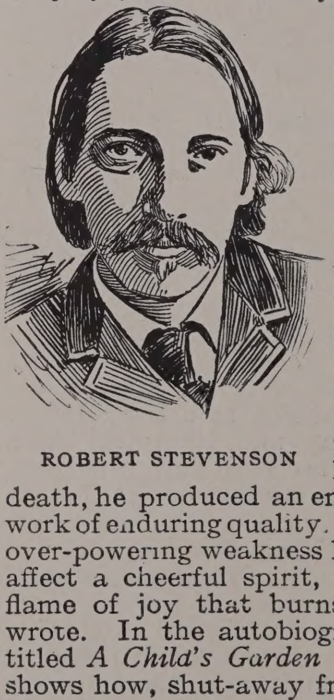
Ste'vens, Alfred, an English sculptor, was born at Blandford, Dorset, England, in 1818. His great work, which ranks him among the great sculptors of England, is the monument of Wellington for St. Paul's Cathedral, London, one of the finest pieces of modeling in England in the 19th century. It was begun in 1856, but was left unfinished at his death on May 1, 1875. In 1892 it was moved from the side chapel, where it had been almost hidden, to the place for which it was originally intended. See *Alfred Stevens* by Stannus.

Stevens Point, Wis., a town, county-seat of Portage County, is on Wisconsin River, 161 miles northwest of Milwaukee. It has a lumber-trade and a number of lumber-mills, besides furniture-factories, foundries, machine-shops, railroad-shops and flour-mills. It has public and parochial schools, a high-school, a commercial school and public library. One of the normal schools of Wisconsin is here. Pop. 14,000.

Stevens, Thaddeus, American statesman, Republican and antislavery man, was born at Peacham, Vt., April 4, 1792, and died at Washington, D. C., Aug. 11, 1868. After graduating in 1814 at Dartmouth College, he studied law and practiced at Gettysburg, Pa., and was subsequently drawn into politics, serving for a time in the state legislature in the Whig interest and becoming an active advocate of the public-school system. In the Whig interest he later served several terms in Congress, and meanwhile removed to Lancaster, Pa., where he rose to a prominent position at the bar. In Congress, in 1850, he opposed the Clay compromise measures, including the fugitive-slave law. In 1858 he was returned to Congress as a Republican, and became one of the ablest leaders of that party, manifesting great powers as an orator. He was a pronounced advocate of emancipation and the enfranchisement of the negro; was bitterly hostile to the seceding states: and stringent in his proceedings against them. He lived to take an active part in the unsuccessful impeachment of President Johnson and to see the readmission into the Union of the first group of reconstructed states. Though skeptical in his religious opinions, he was reverent in his attitude to Christianity — the devout faith of his mother. Part of his estate he bequeathed to an orphan-asylum at Lancaster, Pa., to be open both to white and colored children.

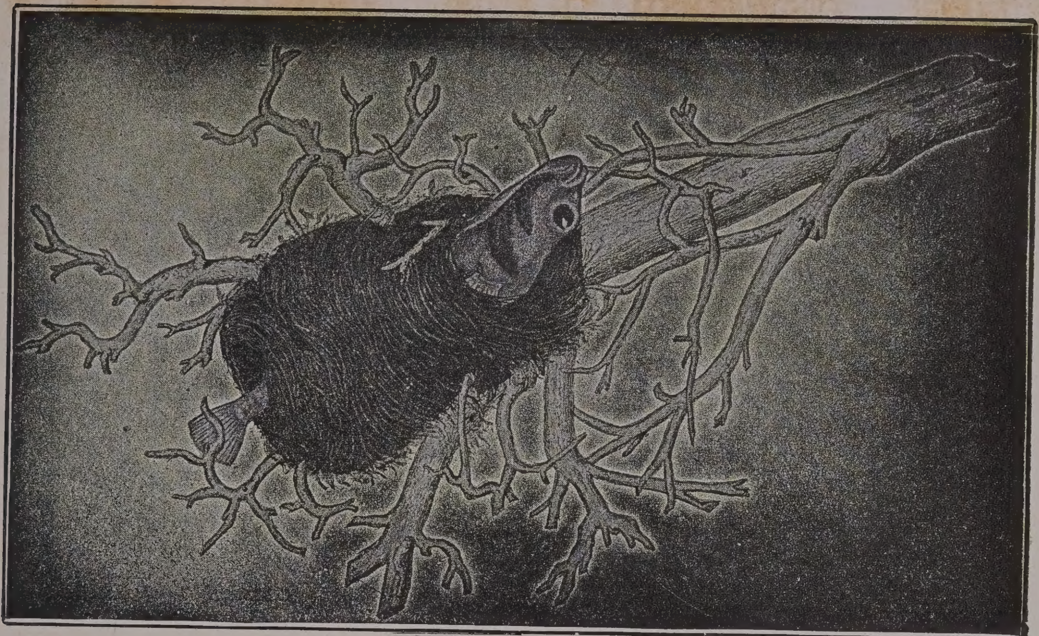
Ste'venson, Adlai E., was born in Christian County, Ky., Oct. 23, 1835. After graduating at Central College, he studied law and was admitted to the bar in 1858. He began the practice of law in Metamora, Ill., and remained there for ten years. He then removed to Bloomington. and was elected Congressman for that district in 1874 and 1878. He was appointed first assistant postmaster-general in 1885 by President Cleveland, and in 1892 was elected vice-president of the United States on the Democratic ticket with Grover Cleveland. He was candidate for governor of Illinois in 1908. He died June 13, 1914.

Stevenson, Robert Louis Balfour (1850-94). The history of English literature records no braver story than the life and work of this blithe story-teller, tender poet and charming essayist. Born in Edinburgh, Scotland, November 13, 1850, he spent much of his childhood in bed, with but the frailest hold on life. He died at the early age of 44. Within a period of 20 years, while waging one long fight with death, he produced an enormous quantity of work of enduring quality. Constant pain and over-powering weakness he did not permit to affect a cheerful spirit, nor to quench the flame of joy that burns in every line he wrote. In the autobiographical poems entitled *A Child's Garden of Verse* Stevenson shows how, shut-away from ordinary childish pleasures, he created a wonder-world of romance out of the simplest things. His bed was "the *pleasant* land of counterpane," not a weariness. Always happy, he was a source of happiness, if of anxiety, to his father and mother, to good Aunt Balfour and to his Scotch nurse who never had the heart to be cross with the "wee, winsome laddie."

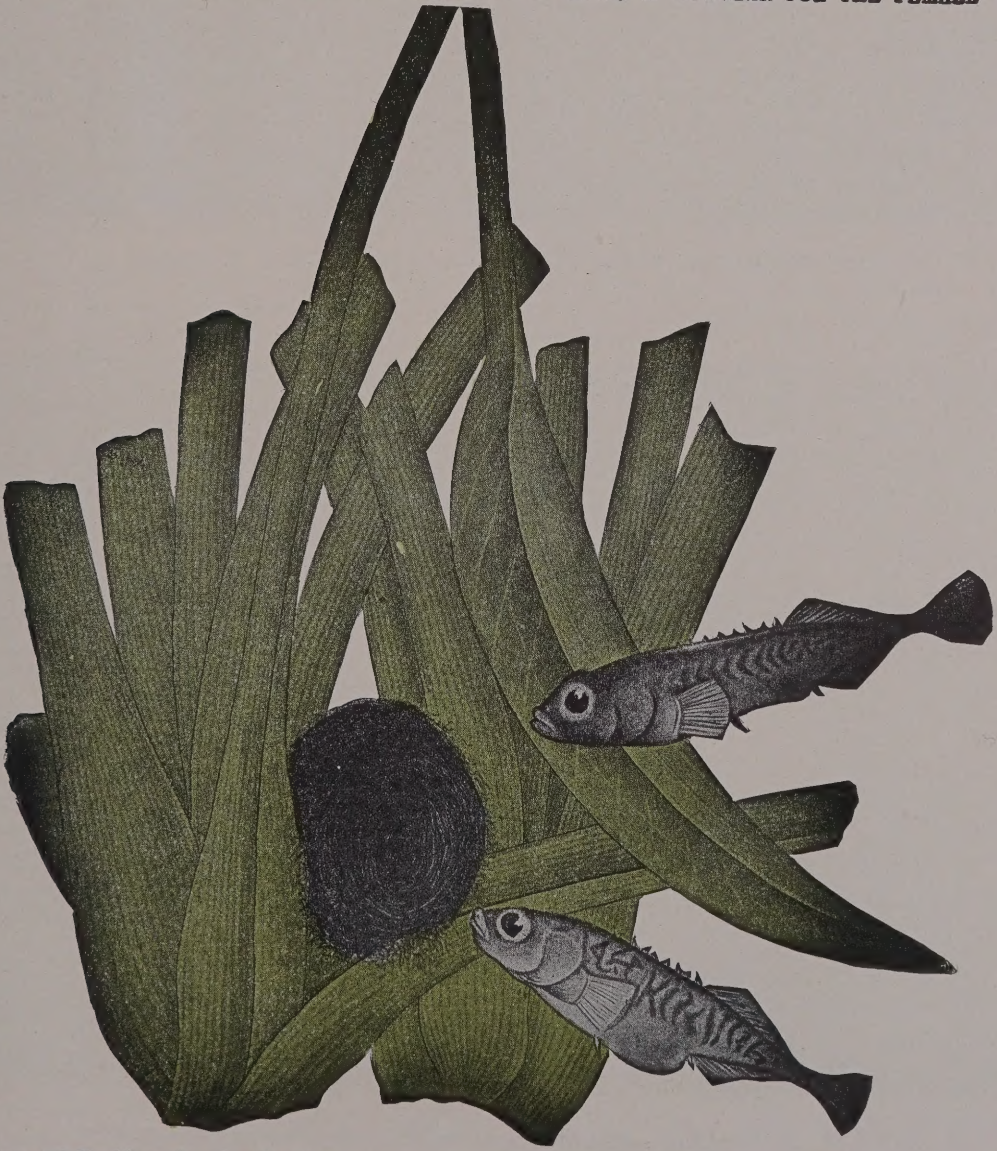


ROBERT STEVENSON

When he grew older, he was able to take the course in Edinburgh University and to study engineering and law, but no regular study was possible in childhood. So he lived

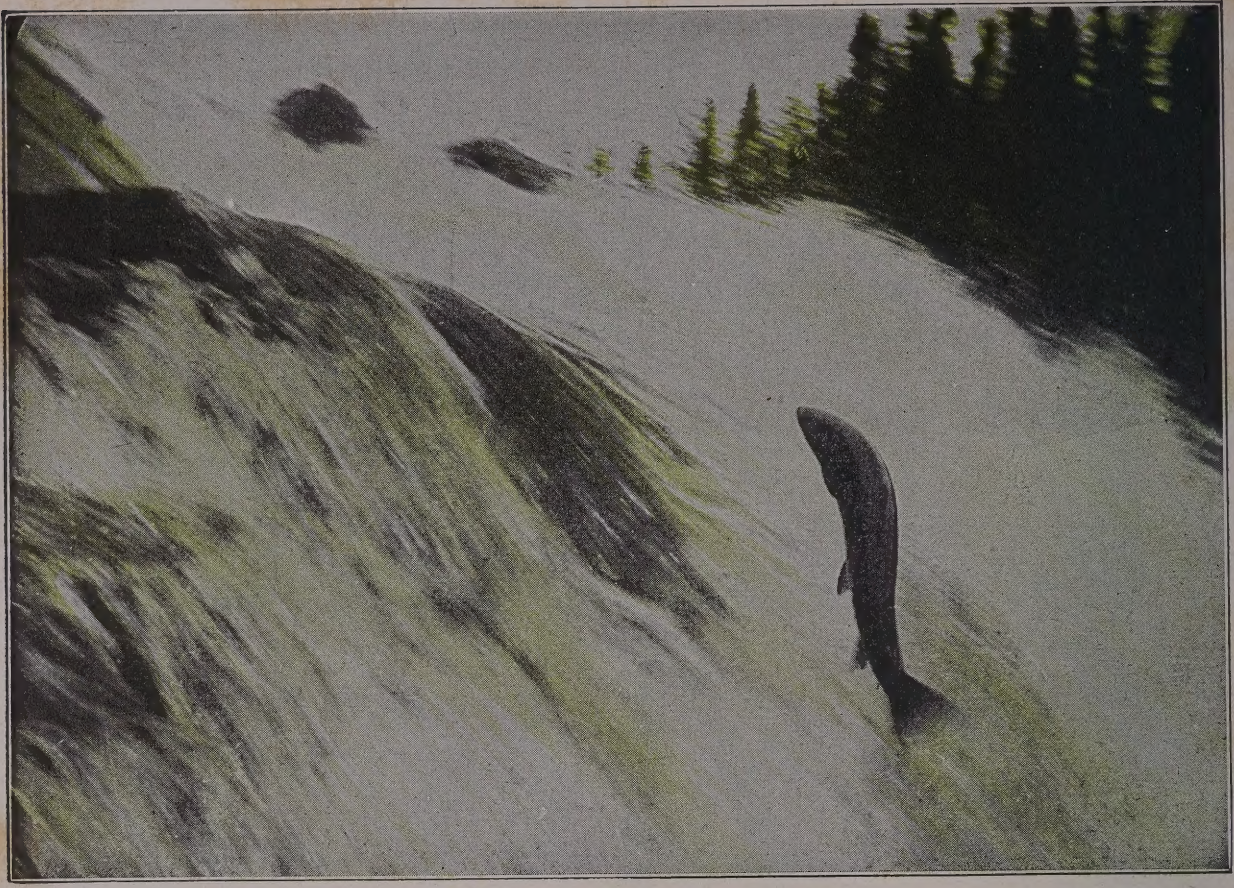


STICKLEBACK MALE ROTATING IN HIS NEST TO MAKE IT TUBULAR FOR THE FEMALE

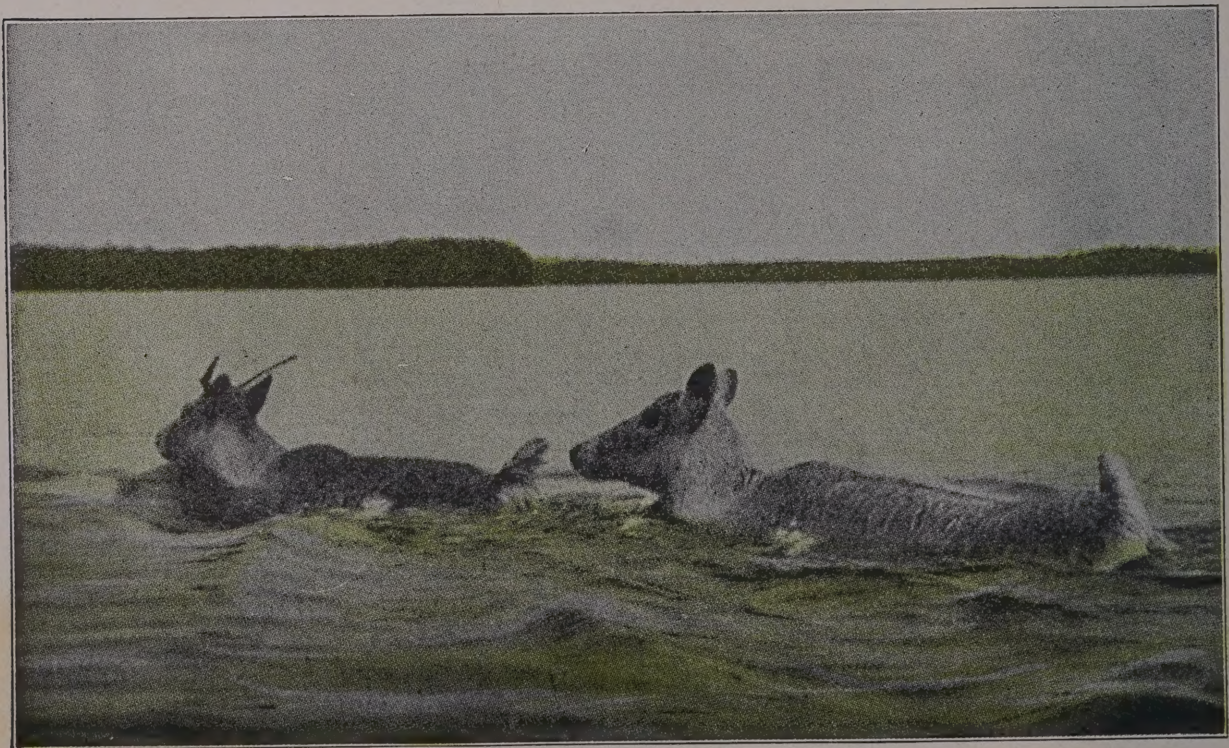


Courtesy of Smithsonian Institution

FEMALE PREPARING TO ENTER A NEST TO LAY HER EGGS



SALMON JUMPING FALLS—Photographed by Dr. R. T. Morris



CARIBOU SWIMMING.—Photographed from Canoe Distant Fifteen Feet much of the time in a beautiful country-home or took journeys with his father, a civil engineer, inspecting lighthouses and harbors about the wild coast. In this way his brain was filled with images of mountain, moor and sea-girt isles, rather than with the symbols in books. His frail health very early settled the question of his carrying on his father's business of engineering or of practicing law. At 24 he was ordered south. Under that title his first essay appeared in an English magazine. "Ordered South" practically was a sentence of death from tuberculosis. The essay recognized this, but it was brave in tone, of polished style, exquisite in its English. The joyous spirit of the youth, pulsating with keen life, refused to accept the verdict. Always afterward he was journeying southward in search of warmer climes, to France, the south of England, California and finally to Samoa in the South Pacific, his heart hungering for Scotland to the last.

That exquisite little classic, *Will o' the Mill*, was published in a magazine in 1872; then came essays, short stories, books of travel. By 1880 his talent had developed to the point of producing *The Merry Men.* In the next ten years *The New Arabian Nights*, *Treasure Island*, *Dr. Jekyll and Mr. Hyde*, *Prince Otto* and *The Master of Ballantrae* followed each other in rapid succession, with *The Child's Garden of Verse*, short stories, poems, essays, each more brilliant than the last and presenting a new facet of his mind. In *Kidnapped* (1886) he made Alan Breck, his hero say: "Am I no' a bonnie fighter?" In 1890 the sympathy and affection of the English-speaking world followed their "bonnie fighter" across the South Seas with the shadow of death in pursuit. He asked but to live, to love, to work. He gained four years more for heroic struggle on the seagirt mountain-side, at Vailima, above Apia. There, in "plain agony of body," when at times the composition of a paragraph made him break into a cold sweat, he wrote *The Island Nights' Entertainment*, *Catriona*, *St. Ives* and *Vailima Letters*, and began *Weir of Hermiston.* Everything he wrote gives the impression of life at full flood, as if he enjoyed the writing as much as we the reading. The story was the thing. He had no lesson to teach, except that of intense interest in life and men and events; joyousness, gay courage, comradery, unselfishness, the adding of a little pleasure to the world's store.

So he died on Dec. 3, 1894, the flame bright till the last moment. His wife and mother and step-children, who had lived but for him, unable to remain where he had passed away, abandoned the South-Sea home to the wild. Him they laid away on Vaea Mountain, Samoa. Forty natives who had loved him cut a path to the summit with their knives and axes. There he lies to-day in the green place of trees and birds and wind-swept solitude in a wide prospect of mountain, sea and sky, with one of his own brave verse for an epitaph:

Under the wide and starry sky
Dig the grave and let me lie.
Glad did I live, and glad will I die,
And I lay me down with a will.

Stevinns, Simon, a Dutch mathematician, statesman and soldier, born 1548; died 1620. Very little is known of his early career. His achievements principally are the following: 1. He invented a number of ingenious proofs for certain theorems in statics and hydrostatics. He also constructed a carriage which was successfully operated by sails. 2. He left an important treatise upon the subject of fortifications. 3. He introduced and advanced the use of (but did not invent) the system of double-entry in bookkeeping and the use of decimal fractions. He held a number of important offices under the Dutch government. For a detailed account of his work in science see Mach's *Science of Mechanics.*

Stew'art, Balfour, a British scientist, was born at Edinburgh, Nov. 1, 1828. In 1859 he was in charge of Kerr Observatory, and in 1870 was professor of physics at Owens College, Manchester. He is known as one of the founders of spectrum-analysis, and his name is associated with such subjects as terrestrial magnetism and the relation between sun-spots and temperature. His *Treatise on Heat*, *Elements of Physics* and *Conservation of Energy* were used as textbooks. He died at Drogheda, in Ireland, Dec. 19, 1887.

Stewart, William Morris, United States senator and lawyer, was born at Lyons, N. Y., Aug. 9, 1827, spent his early life in Ohio, and entered Yale College; but before graduating was attracted by the gold-discoveries in California, and proceeded thither in 1850. He mined in Nevada County and amassed wealth, after which he studied law and was admitted to the bar. In 1854 he was attorney-general; but some years later he removed to Virginia City, Nev., and became interested once more in mining and in the development of the famous Comstock lode. In 1861 he was chosen a member of the territorial council, and two years later member of the constitutional convention. From 1864 to 1875 he was United States senator, and became prominent as a free-coinage advocate. Meanwhile he resumed the practice of his profession, though, in 1887, he was again elected to the United States senate, serving until 1905.

Stickleback (*stĭk'k'l-băk'*), the name for small fishes with spines on the back. There are about 20 species, all inhabiting the northern hemisphere, and their spines vary from two to 15. They live in fresh, brackish and salt waters. The common fresh-water stickleback is about four inches long, with three or four spines. It is abundant in streams in the United States and in Europe. In America it ranges from New York to Greenland. The brook-stickleback is abundant in small brooks from New York to Kansas and North to Greenland. Its length is two and one half inches, and there are five spines on the back. The largest stickleback is the many-spined stickleback, a salt-water fish found on the eastern side of the Atlantic. Nearly all sticklebacks are nest-builders. The males alone build the nests and guard them. They are provided with glands which open on the ventral surface, secreting a gelatinous substance used in holding the parts of the nest together. The nest is made of stems of water-plants and is attached to a stationary object. It is barrel-shaped with two openings, through which a current of water continually passes. Several females deposit eggs in one nest in different layers. They are fertilized by the male as soon as laid. He keeps guard, not only while the eggs are hatching but after the young fish are born.

Stig'ma (in plants), a specially constructed surface in connection with the carpel, for receiving the pollen. The surface is composed of papillate outgrowths which secrete a sugary solution. By means of this solution the pollen-grains are held and nourished for the development of the pollen-tubes. The stigma usually occupies some special region of the style, either its more or less broadened apex or a line or band down one side. See FLOWER.

Stilicho (*stĭl'ĭ-kō*), **Flavius,** famous Roman general, born about 359 A. D., who rose rapidly, becoming ambassador to Persia in 384, and governor of the western empire in 394. He attacked and defeated Alaric in northern Italy at Verona in 403. For domestic reasons he made an alliance with Alaric later, but abandoned the plan when 200,000 of Alaric's Goths came down into Rome. He conquered them, selling large numbers as slaves. Honorius, the emperor, turned against him, and he fled to Ravenna where he was murdered in 408. Three months later Alaric and his Goths were at the gates of Rome.

Still'water, Minn., county-seat of Washington County, on St. Croix River, 18 miles by railroad from St. Paul. It has the lumber trade of the St. Croix valley, and has flour mills, sawmills, a foundry, an extensive traction-engine and thrashing-machine factory, shoe and wood-furnishing factories and the Minnesota prison. Population 10,198.

Stinnes, Hugo. (1869–1924) German financial wizard, died one of the world's richest men, though he lived and amassed wealth in a country which suffered defeat in war, and incurred upon itself what amounted practically to a bankruptcy of its currency. His grandfather and father had become rich in mining and river freighting business in Westphalia. Inheriting their holdings, Hugo expanded the enterprises until his wealth was estimated at about $8,000,000 before the War. The War offered him his greatest opportunities. The German occupation of Belgium brought profit to his pocket; the sale of war supplies expanded his coffers. He became miner, forester, shipper, manufacturer, and banker. His holdings grew in many fields, and he was a director in nearly a hundred huge business enterprises. He brought forcibly to the attention of the business world the value of the vertical trust rather than the horizontal trust. His ownership began with the raw materials and never escaped his hands until the sale of the finished articles were made. Others had labored only to control one process of the series. On April 10, 1924, he died, leaving $250,000,000, to his family.

Stir'ling, a town of Scotland, on the River Forth, 29 miles from Glasgow. The castle stands on Castle Hill, 420 feet above the sea. Most of the present castle belongs to the days of the Stuarts, whose sovereigns often kept court there. There are the Douglas room where Earl Douglas was stabbed by James II in 1452; the parliament-hall of James III; the palace of James V and the chapel of James VI; the church of the Holy Cross; the statue of Bruce; the guild-hall; the old and the new bridge; and Smith Institute, with art-gallery, reading-room and museum. The town is connected with nearly all the most important events in Scottish history: the deaths of Alexander I and William the Lion; Wallace's victory at Stirling Bridge; a siege of the castle by Edward I; the birth of James II and of James V; crowning of Queen Mary; the slaughter of Lennox; and the capture of the castle by Monk. Stirling has manufactures of tartans, tweeds, carpets and agricultural implements. Population 18,895. See *History of the Chapel Royal of Stirling.*

Stirling, James Hutchinson, a modern Scottish philosopher, was born at Glasgow, June 22, 1820. He studied medicine and practiced a short time in Wales. He went to Germany to study philosophy, his first work, *The Secret of Hegel,* published in 1865, giving him at once a high rank among philosophers. He has also written a *Textbook to Kant; Sir William Hamilton,* an attack on his philosophy of perception; *Lectures on the Philosophy of Law;* and *As Regards Protoplasm.* Other miscellaneous works are *Jerrold, Tennyson, Macaulay* and *Burns in Drama.*

Stock'holm, the capital of Sweden, is built on several islands and a part of the mainland, between a bay of the Baltic and Lake Malar. It is considered one of the most picturesque sites in Europe. The palace, dating to 1697, St. Nicholas church in which the kings are crowned, the House of Nobles, the town-house and a magnificent granite quay are on the island called the Town; the Knight's island, west of the Town, is occupied by public buildings, as the houses of parliament, the old Franciscan church in which many of the kings of Sweden have been buried, and the chief law-courts. In Norrmalm, a district north of these islands, are the national museum with very valuable collections of antiquities, coins and paintings, the academy of fine arts, Hop Garden with a statue of Linnæus, the Royal Library of 250,000 volumes and an observatory. Ship Island, lying east of the Town island, is the headquarters of the Swedish navy, and still farther east is the beautiful island of the zoölogical gardens. The islands are connected with each other and the mainland by bridges, and small steamers ply rapidly between them. The islands and channels make Stockholm the Venice of the north. Though the harbors are closed for three or four months every winter, there is a large trade, with considerable manufacturing of sugar, tobacco, silks, ribbons, candles, linen, cotton and leather. Stockholm was founded by Birger Jarl in 1255, besieged by the Danes in 1389, and captured by Christian II of Denmark in 1520, when a terrible massacre followed, known as "the bloodbath of Stockholm." The city contains 341,986 inhabitants, the mass of whom are Scandinavians and Protestants and adhere to the Lutheran church. There are a state faculty of medicine with 273 students and a private philosophical faculty. Public elementary education is free and compulsory, and all children not attending the public schools must furnish proofs of having been privately educated. See SWEDEN.

Stock'port, a city in England, 37 miles east of Liverpool. It is built on the slopes of a deep ravine where two small rivers unite to form the Mersey, which is here crossed by a railroad viaduct, 111 feet high and 1,875 feet long. There are a 14th-century church, rebuilt in 1817, market-hall, free library, museum and St. Peter's square, with a statue of Richard Cobden. Stockport was the site first of a Roman station, then of a Norman castle, which was taken by Prince Rupert in 1644. It is an important seat of the cotton-industry, and has grown rapidly in spite of riots and strikes and the cotton-famine of 1861–4. There also are iron and brass foundries, engine and machine shops. Population 108,693.

Stock'-Raising. One of the most important industries in the United States; closely associated with agriculture, though some stock is yet sent to market directly from the western pasture-lands. East of the Alleghenies not much stock is raised for market, but large herds of dairy-cattle are found, while every farm has a few horses, hogs, sheep and cows to supply home needs. The Mississippi Valley and the western plains produce vast wealth in stock every year.

In America the pig has been coëxtensive with Indian corn, the greatest of food-crops. Consequently Chester County, Pa., developed the first truly American breed of swine, the Chester White, while Miami Valley, Ohio, about 1860 produced the well-known Poland China hog. The Miami Valley then was the world's corn and hog center, Cincinnati the chief American market. As the prairie states, however, were settled, a sudden change occurred in stock-raising. Indian corn spread to the arid plains, the bison disappeared and the steer and the hog followed corn to the boundary of cultivation. Then the ox went alone across "the Great American Desert" to the Rockies, and from 1870 to 1890 countless herds of cattle grazed from the Rio Grande to Canada. By 1900, however, the settlement even of "the far west" had ended this free ranging. Now the range-business is confined to producing feeders and shipping them eastward to be fattened in the corn-belt of Iowa and Illinois. The ruined grazing-lands of the southwest are being restocked with native grasses, and in Montana, North Dakota and South Dakota horses are raised on the prairie-pastures as extensively as cattle and sheep once were.

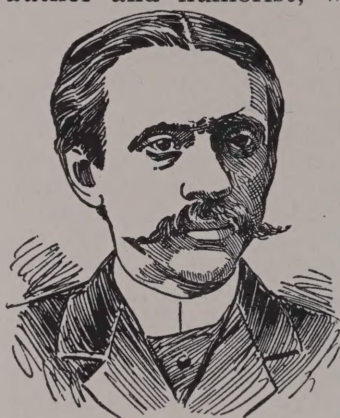
So American stock-raising has developed into the most gigantic live-stock industry ever known. The grass-lands of the far west and the corn-belt of the central west complement each other, each supplying what the other lacks. Land unfit for cultivation, where grass is cheap but corn and shelter wanting, is utilized for producing cattle and sheep. Breeding-herds that supply superior sires and dams are raised in the corn-belt, and this is the finishing or fattening ground for the stock from the western ranches. So Chicago, Omaha and Kansas City have become the markets for this immense industry. (See STOCK-YARDS). The prairie-pastures can, indeed, fatten sheep, finish many kinds of horses or even put fairly-good cattle into the market; but the cost of shipping live-stock from the range to the finishing ground is so great that live-stock must both be produced and finished at each place. Consequently farmers are breeding their own stock and developing it as part of the system of enriching their land. The meat-supply of the United States must henceforth be raised on the American farm; and live-stock is accompanied by leguminous crops (which animals alone can eat), which are the only feasible means of cheaply maintaining the nitrogen-supply and fertility of the soil. Hence stock-raising will play a larger and ever larger part in American farming.

The vastness of the live-stock industry in the United States is shown by the following statistics of domestic animals in 1910: Cattle (cows, bulls, etc.) 61,225,791; horses and colts 19,731,060; mules 4,183,572; asses and burros 110,012; sheep 51,809,068; swine 58,600,632; and goats 1,948,952. See Agriculture (*Stock-Breeding* and *Stock-Feeding*, p. 31); Cattle; Hog; Horse; Meat-Packing; Milk; Mule; Sheep; Swine; and Wool.

Stocks are the rights in the property of a corporation which those persons possess who have contributed to its capital. Each corporation has a certain capital-stock which may be raised for the purposes of its business but need not be fully paid up. This amount is divided into shares. Certificates are made out for these shares, say $100 shares or $10 shares as the case may be. These certificates are sent to those who have paid up the capital, in proportion to the amount which they have paid. Thus if the stocks be at par, a man who had subscribed $1,000 to a certain stock would receive ten $100 certificates. But the business of the corporation may fall short of expectations; or it may exceed them. In the former case the value of the paper certificates will decrease; in the latter case it will increase. So a stock is rarely at par, *i.e.*, at such a mark that a hundred dollar certificate is worth exactly one hundred dollars. Stocks are liable to fluctuate in value not merely according to the value of the business which they represent, whether a mine, a railroad, a great commercial concern or what not, but according to the plentifulness or scarcity of money which is being invested.

There are many who almost gamble on the fluctuations of stocks. Some buy merely in order to sell; and it is to their interest to *bull* the stock or advance it in price. Others sell stock which perhaps they do not possess; believing that, by the time they will be compelled to hand over the stock, they will be able to buy it more cheaply than they have agreed to sell it. In the stock-market the former class are known as "bulls;" the latter as "bears." The mere manipulation of stock is undesirable. The member of the public who thinks that he can compete with the professional stockbrokers is likely to suffer heavy loss. He will do better to make a genuine investment in a stock, with the idea, not of selling, but of getting good interest on his money from the dividends which the stock pays out of the proceeds of the business which it represents. On every transaction in stock the buyer or seller pays one-eighth *per cent.* of the money which he pays or receives for the stock to a broker. The number of brokers in a stock-exchange is limited. Their seats are property, and may be inherited; but they are occasionally sold to a would-be broker. A seat in the New York Stock Exchange has sold for $88,000. See Board of Trade.

Stock'ton, Cal., county-seat of San Joaquin County, is on an arm of San Joaquin River. It has a good harbor, and the river is navigable at all seasons from San Francisco. The city is supplied with water by artesian wells. There are a convent, a state hospital and factories making ironware, flour, engines, cars, window-glass, leather, soap and carriages. The city is served by the Southern Pacific (Central Pacific), Santa Fé and Western Pacific railroads, as also by two traction-companies. The population is 42,000.


F. R. STOCKTON

Stockton, Francis Richard. American author and humorist, was born at Philadelphia, April 5, 1834, and, after graduating at the high school of that city, took to journalism as a profession and to contributing to the magazines. Joining the staff of *Scribner's Monthly*, he wrote much for it and *St. Nicholas*, of which he became assistant-editor. In this appeared many of his delightful stories for the young. He became a prolific and industrious author, his stories revealing quaint but unobtrusive humor, with a brightly graphic quality and a literary style that commend his work to the educated and refined. His more prominent works embrace *Rudder Grange*, *The Lady or the Tiger*, *Pomona's Travels*, *The Casting Away of Mrs. Leeks and Mrs. Aleshine*, *The Dusantes*, *The Great Stone of Sardis*, *A Bicycle of Cathay* and *The Captain's Toll-Gate*. He died on April 20, 1902.

Stockton, Robert Field, an American naval officer, was born at Princeton, N. J., in 1795. He entered the navy in 1811, went to Africa in 1821, and helped to secure the republic of Liberia for the American Colonization Society. He was sent to the West Indies against the pirates and served in the Mediterranean. In 1845 he was sent to the Pacific coast, and next year, with Frémont, conquered California for the United States. In 1851 he was elected United States senator. He died at Princeton, N. J., Oct. 7, 1866.

Stock-Yards. Enclosures in cities where live-stock is cared for on its way to market or at market. With the development of the central and western states arose the necessity for convenient markets for distribution and sale of the enormous production of live-stock of these regions. (See

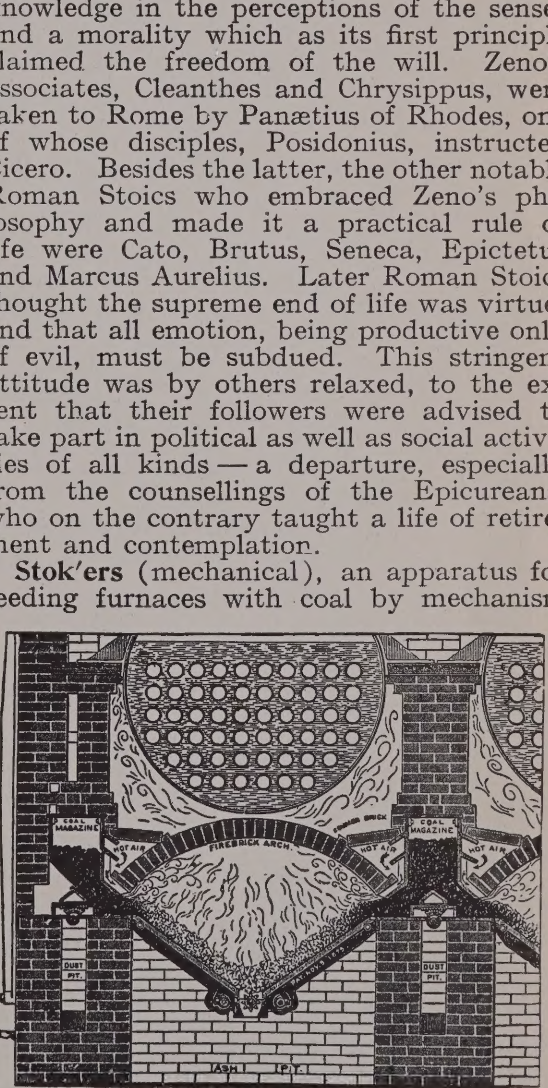
Stock-Raising). While all smaller cities had pens for the use of shippers and traders, great yards grew up in such centers as Cincinnati, Indianapolis, East St. Louis, Kansas City and Chicago, the latter outstripping all others, but those at Omaha and Kansas City being close seconds. Great slaughter- and packing-houses are found in connection with these large yards. The Union Stock-Yards of Chicago, with their 500 acres of yarding, 13,000 pens, 25 miles of street and 300 miles of railroad-track, are the largest live-stock market in the world. Thousands of carloads of stock arrive every day, most of it to be slaughtered, the remainder to be reshipped. The average number of hogs packed in Chicago annually for the past two decades is five million, considerably over one third of all packed in the world. In the year ending on March 1, 1910, there were 5,161,552 packed. The total value of the packing-house products of that city in 1909 was $325,062,000. There are 25,000 men employed. The disposition of filth from slaughter-houses has been a great sanitary problem. It has been almost completely solved, use now being made of every portion of the slaughtered animal. The strictest sanitary rules are enforced, and cleanliness prevails.

Stoddard, Charles Warren, an American author, was born on Aug. 7, 1843, at Rochester, N. Y. His education was obtained at the University of California. For some time he was an actor; then he became traveling correspondent of *The San Francisco Chronicle.* During this time he spent five years in the South Seas, and visited nearly every portion of the earth. He was professor of English literature at Notre Dame College, Indiana, from 1885 to 1887, and held the same position in The Catholic University of America at Washington, D. C., from 1889 to 1903. Among his publications are *South-Sea Idyls; Summer Cruising in the South Seas; The Lepers of Molokai;* and *Lazy Letters from Low Latitudes.*

Stod′dard, Richard Henry, American poet, critic and man-of-letters, was born at Hingham, Mass., July 2, 1825, and for a time attended school in New York, after which he worked as an iron-molder, meanwhile with love and assiduity cultivating the Muses. He subsequently held a position in the New York customhouse, was confidential clerk to General McClellan, city librarian in New York and reviewer for the New York *Mail and Express.* With poetic power, he possessed the true lyrical note, affluent imagination and much love of the beautiful. He was well-endowed as a critic, and his prose is that of a scholar and literary student. Many of his shorter poems have found their way into the heart, as *The Two Brides, The Flight of Youth, Along the Grassy Slope, Pain in Autumn* and *The Dead.* His chief published volumes embrace *The Book of the East, A Century After, Songs of Summer, Poems, Under the Evening Lamp, Adventures in Fairy-Land, The King's Bell, Life of Humboldt* and *Life of Washington Irving.* He also edited the *Bric-à-Brac* and *Sans Souci* series. He died on May 12, 1903. Consult his *Recollections.*

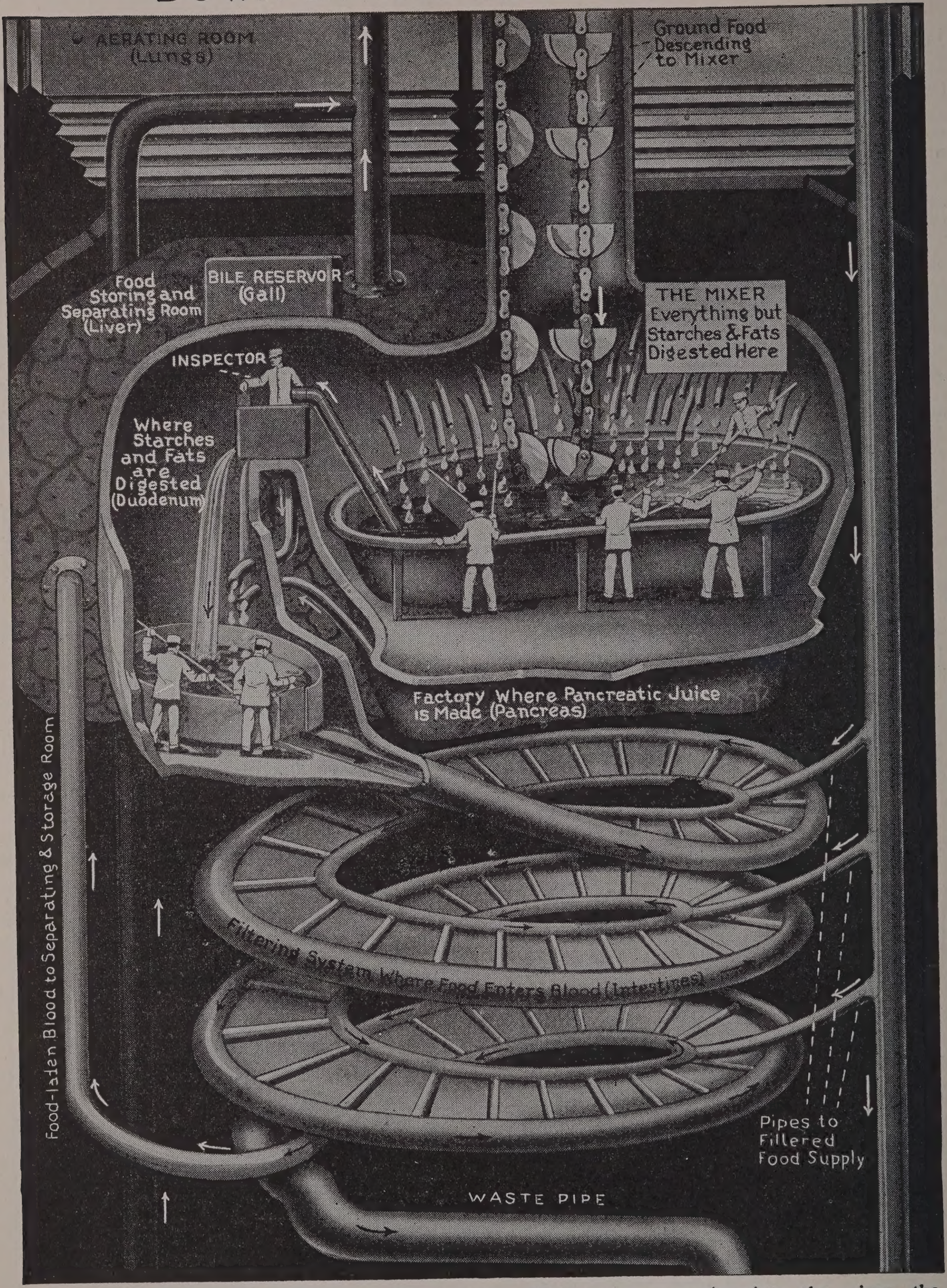
Sto′ics, philosophers who flourished first in Greece under Zeno, a native of Cyprus (340-260 B. C.), and later in Rome. They were so called from the porch or *Stoa Poacile* at Athens, where Zeno, their founder, walked and taught, with his chief disciples, Cleanthes and Chrysippus, developing and systemizing the Stoic doctrines. These doctrines sought to reconcile a theological pantheism and a materialist psychology with a logic which sought the foundation of knowledge in the perceptions of the senses and a morality which as its first principle claimed the freedom of the will. Zeno's associates, Cleanthes and Chrysippus, were taken to Rome by Panætius of Rhodes, one of whose disciples, Posidonius, instructed Cicero. Besides the latter, the other notable Roman Stoics who embraced Zeno's philosophy and made it a practical rule of life were Cato, Brutus, Seneca, Epictetus and Marcus Aurelius. Later Roman Stoics thought the supreme end of life was virtue; and that all emotion, being productive only of evil, must be subdued. This stringent attitude was by others relaxed, to the extent that their followers were advised to take part in political as well as social activities of all kinds — a departure, especially from the counsellings of the Epicureans, who on the contrary taught a life of retirement and contemplation.

Stok′ers (mechanical), an apparatus for feeding furnaces with coal by mechanism operated by power. Finely broken coal is used, and is ordinarily stored in elevated bins in front of or over the furnace. From these elevated bins it runs down through chutes into the coal-magazine of the stoker.



GRATE-FEED OF A MECHANICAL STOKER

DOWN IN THE MIXING ROOM


AERATING ROOM (Lungs)
Ground Food Descending to Mixer
BILE RESERVOIR (Gall)
Food Storing and Separating Room (Liver)
THE MIXER Everything but Starches & Fats Digested Here
INSPECTOR
Where Starches and Fats are Digested (Duodenum)
Factory Where Pancreatic Juice is Made (Pancreas)
Filtering System Where Food Enters Blood (Intestines)
Food-laden Blood to Separating & Storage Room
Pipes to Fillered Food Supply
WASTE PIPE

Here the food is mixed with the gastric juice which you see pouring into the mixer, the stomach, from all sides. Then it passes into the duodenum, but the inspector there stops and sends back for further treatment food not sufficiently mixed. In the duodenum the starches and fats are digested by the bile and the pancreatic juices you see coming from the two pipes. From the duodenum the food is carried into that long coiled tube representing the intestines, and as it passes along part of it is taken out and emptied in the blood, while the waste goes into the waste pipe.

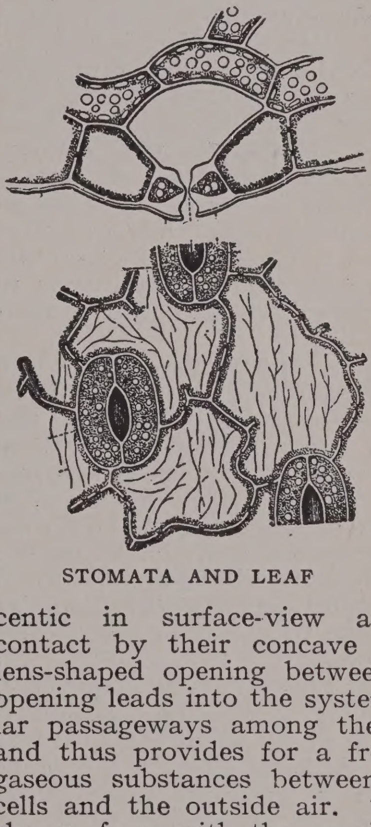
It is then fed regularly to the fire by some mechanism. In the Roney stoker coal is carried to the fire on a series of connected rocker-bars, arranged on an incline. In another common furnace the coal is pushed down the inclined sides of the furnace by an oscillating pushing-bar. The advantages of a mechanical stoker are that coal is fed more uniformly, smoking is decreased, a lower grade of coal can be used with advantage and hand-labor is saved. Mechanical stokers are to-day used in many large stationary furnaces.

Stoke-upon-Trent, a manufacturing town in Staffordshire, England, on Trent River. It is a modern town noted for its factories of porcelain, earthenware, tiles and tesselated pavements, which are among the largest in the world. Coal-mining, bricklaying and iron-works are also carried on. There are statues of Wedgwood and Minton in the city. Population 89.015. See *Borough of Stoke-upon-Trent* by Ward.

Stolon (*stō'lŏn*), a branch especially adapted for propagation, as in the ordinary houseleek. The houseleek, surrounded by its stolons, each bearing a young plant at its tip, is sometimes called "hen and chickens." An equivalent word is "offset."

Stom'ach, an organ of digestion, present in some form in all animals above the sponges, with the exception of a few degenerated parasites. It is merely a receptacle for the food, and is provided with glands which secrete a digestive fluid. Digestion however, is carried farther and completed in the intestine and, therefore, the stomach is not the sole organ of digestion. The stomach of the human body is a sac on the left side just below the diaphragm. It has four coats: an outer, firm, serous coat; a muscular coat, with fibers arranged in longitudinal, transverse and oblique directions; a coat of loosely woven fibrous tissue; and an inner, mucous coat. The glands which secrete the gastric juice are derived from the latter coat. There are two varieties, those nearer the heart, called cardiac glands, and those at the other end of the stomach where the intestine is joined, called the pyloric glands. The latter are the more important. The stomach is under control of the nervous system, both as to its movements and as to the secretion of gastric juice. When food is introduced into the stomach, the secretion of gastric juice is stimulated through the nervous system. The gastric juice contains a ferment called pepsin, which acts especially on proteids like lean meat, white of eggs, gluten of bread etc. This action takes place in the presence of acid, and in the glands are certain cells which provide hydrochloric acid in small amount. When this is deficient, grave stomach disorders arise. The food is reduced to a condition called chyme and is passed on into the intestine. The object of digestion is to render food soluble that it may pass by absorption through the walls of the stomach and intestine. This is not a process depending upon life, as it can be performed with artificial gastric juice outside the body. The characteristic action of the gastric juice is upon proteids, while the pancreatic juice, which is introduced into the intestine, is a universal digester, of greater efficiency than the gastric juice. It aids in the digestion of starches and fats as well as in completing that of the proteids.

Stomata (*stŏm'ȧ-tȧ*) (in plants). Narrow openings are developed in the epidermis of all aërial parts of plants which require and emit gases. (See Aëration.) Gaseous exchanges especially abound in green tissues; hence stomata are chiefly displayed by the foliage-leaves of the higher plants. Each stoma consists of two specially organized epidermal cells, called guard-cells, which are crescentic in surface-view and, being in contact by their concave faces, leave a lens-shaped opening between them. This opening leads into the system of intercellular passageways among the working-cells, and thus provides for a free exchange of gaseous substances between the working-cells and the outside air. The guard-cells change form with the varying amounts of moisture in the air, and so regulate the size of the opening between them. Stomata have been called "automatic gateways" on account of this peculiar power of the guard-cells. See Leaf and Transpiration.



STOMATA AND LEAF

Stone-Age is a term used to designate a stage of culture in man's development, not a chronological period in geological history. It refers to the period among any people when the use of metals is unknown or, if known at all, does not involve the knowledge of smelting. At such a time stone is largely used in making implements and tools, though other materials, as wood, bone and shell are also employed. The stone age is known to have existed in Europe many hundreds of years ago; in North America it continued among the Indians until the 18th century; in some other places it probably exists at the present time.

The great mass of evidence for the stone age has been gathered in western Europe, and that period has been subdivided into the paleolithic (old-stone) and neolithic (new-stone) eras. During the earlier time the implements were rudely chipped and left rough and irregular; in the later time they were often highly polished and finished with great care. Paleolithic man is thought to have existed in southern Europe while much of the continent was covered with ice. His presence there is known by the chipped flints found in place in beds of gravel and loess of France, which Prestwick and Lyell identify as drift-formations from the early ice invasion. Neolithic implements, specimens of which are much more numerous, have been collected in the oldest lake-dwellings of Switzerland and especially in Denmark. They are nowhere associated with river gravels, nor have paleolithic remains been found in Denmark. In that country the polished stone-implements and bits of pottery found in the shell-heaps of *kjökken-mödding* (kitchen-middens) indicate that man had reached a higher stage of culture by the time he had reached that region in his northward migration after the retreating ice-sheet.

Stone, Harlan Fiske (1872–). As a lawyer in private practice, Harlan Fiske Stone could make over $100,000 a year. But, like many others in public service, he gave up his office in New York City to become attorney general of the United States when President Calvin Coolidge urged him to accept, at a salary of $12,000. Later, on the retirement in 1925 of Associate Justice McKenna from the Supreme Court, President Coolidge elevated Mr. Stone to a seat in the highest court of the nation.

He was born at Sheffield, New Hampshire, but when he was two years of age his parents moved on a farm in Massachusetts. He was graduated from Amherst College, where he became a friend of President Coolidge, in 1894. Following his graduation from the Columbia Law School in 1898, he practised law in New York. His private duties, however, did not keep him from being of service to his profession, for as lecturer, professor, and finally dean of Columbia Law School, his work in advancing the standards of legal training made him an outstanding educational figure.

Stone'henge is a circle of stones on Salisbury Plain, England, and was classed as one of the four wonders of England. It is a set of circles and oval figures. The first circle has pillars of stone about 13 feet high and four feet apart, and stones placed across on top. There are about 140 stones of the different circles, some being 23 feet high. It is also found to be a burial-place. The stone circles of Norway and Sweden seem to be burial-places of the iron age. The circles are rare south of the Baltic, there being only a few in France and Algeria. Consult Fergusson's *Rude Stone Monuments.*

Stone, Lucy (Blackwell), American reformer and advocate of woman's rights, was born at West Brookfield, Mass., Aug. 13, 1818, and died at Dorchester, Mass., Oct. 18, 1893. Graduating at Oberlin College in 1847, she devoted herself to advocacy of woman-suffrage and to antislavery, for which she became a zealous worker. She lectured widely in favor of woman-suffrage, organizing wherever she went local societies of the Woman's Suffrage Association, of which she was one of the founders as well as editor of the (Boston) *Woman's Journal,* its mouthpiece. She aided in organizing, in 1850, the first national woman's rights convention at Worcester, Mass., and was always zealous in the cause she held dear to her heart. In 1855 she married Henry B. Blackwell, though stipulating to bear her maiden name.

Stone, Warren Sanford (1860–1925). Can you imagine yourself organizing and directing financial enterprises with resources of over $145,000,000 during the last five years of your life, after you had been a locomotive fireman and engineer for twenty-four years, and a labor leader for seventeen years? If you can, you can imagine yourself living the life of Warren Sanford Stone, the great labor leader who showed labor how to use capital for its benefit.

He was born on a farm near Ainsworth, Iowa. He attended Western College, but withdrew in 1897, becoming a fireman on the Rock Island Railroad at the age of nineteen. After five years he was made an engineer, and nineteen years later grand chief of the Brotherhood of Locomotive Engineers. He moved to Cleveland, Ohio, and from 1903 to 1920 directed activities of the union. In 1916 he led the eight-hour movement, resulting in the Adamson law.

Mr. Stone now saw the opportunity of leading the labor organization into the field of capitalistic investment. In 1920 there came into existence the Brotherhood of Locomotive Engineers Co-operative National Bank. Other banks were added, and before his death the Brotherhood held controlling interest in fourteen banks throughout the United States, six finance companies, and four large and several smaller office buildings. One building, the Equitable of New York, stands forty stories high, and is the largest office building in the world. Mr. Stone's leadership was of permanent value, for he taught labor how to use money.

Stoneworts (*wûrtz*), the common name of species of *Characeæ* (*q. v.*)

Stony Point, a rocky point on Hudson River, 42 miles north of New York. There was a fort here, and one on the point opposite, during the Revolutionary War, which were captured by the British, but the Stony Point fort was retaken by Anthony Wayne in a bold night attack, July 16, 1779.

Stor'age-Bat'tery, a form of voltaic battery in which the energy, when once used, may be replaced by a process known as charging.

Like almost every other form of voltaic cell, the storage-cell consists of two conductors of the first class and one of the second class. In this case the conductors of the first class are *lead* and *lead-peroxide*, while the conductor of the second class is a solution of sulphuric acid.

This form of voltaic cell was devised in 1860 by Planté, a Frenchman. He started with two lead plates in sulphuric acid. By passing an electric current from one of these plates through the acid to the other, he succeeded in oxidizing the anode, while the cathode remained metallic lead. By frequently changing the direction of the current passed through the cell the lead-plates were rendered porous and spongy and made to present a large surface. This process is known as forming the plates. Finally a current is passed through the cell in one direction until one plate is thoroughly oxidized, while the other remains spongy, metallic lead. This process is known as charging the cell.

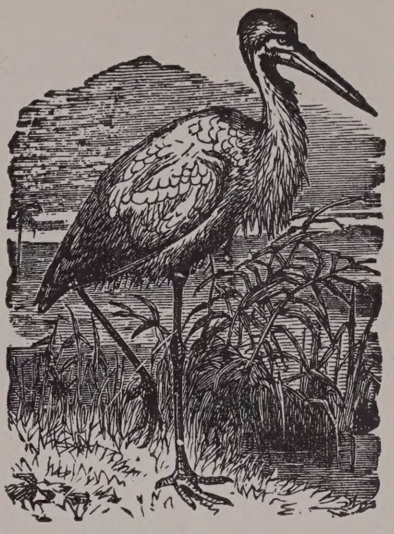
The charging simply restores the oxygen to the positive plate and removes the oxygen from the negative plate. Voltaic cells are divided into two classes according as they require charging or not. Those which require charging are called *secondary* cells; while cells of the Daniell or Bunsen type, which are made up once for all and continue to work until one of the electrolytes or one of the electrodes is exhausted, are called *primary*.

In 1881 Faure devised a process of putting a paste of red lead (lead-peroxide) on the positive plate and shortening the process of forming. But in the very best cells of recent years there has been a partial return to the process of Planté. When a storage-cell is being used, the current *in the cell* flows from the spongy bed-plate to the plate which is covered with lead-peroxide (Pbo_2). The result is that the former is oxidized and the latter reduced from lead-peroxide to lead-oxide. When all the peroxide is used, the cell must be charged again.

From the preceding it is evident that what is stored up in this cell is chemical energy, and not electricity, as is sometimes popularly supposed. The great merit of its storage-cell is its high electrical pressure, more than two volts, combined with a very low internal resistance. This low resistance permits the use of enormous currents without wasting much energy inside the cell.

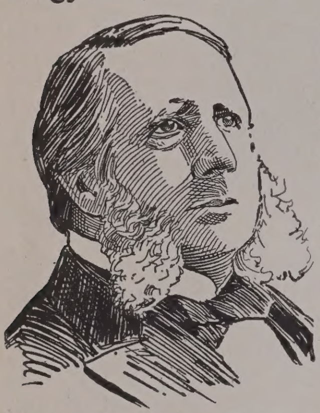
Storage-cells are used for an endless variety of purposes; but their principal use may be reckoned as that of a "booster" in helping the dynamo during the busy hours at the electric-light station and the street-railway power-house. Many tons of storage-cells are employed also in driving automobiles and small launches. Storage-cells are often called accumulators.

Stork, a large, heron-like bird with bill much longer than the head and very stout at the base. The common migratory stork of Europe is the best-known member of the family. It is a friendly bird, nesting on housetops, old chimneys and steeples, as well as on tall trees, and is regarded as a bird of good omen. It breeds in Holland and Germany, but not in France, Italy or Russia. It is about three and one half feet long, white, except the wings which are partly black. In the autumn these birds gather in large flocks and migrate to Africa, where they spend the winter. They frequent marshy places and feed on frogs, fishes, snakes, slugs, young mammals and insects. There are about 20 species in tropical and temperate parts of the world. There is only one form that breeds in North America, the wood-ibis, which is about the length of the European stork. It is mainly white, with glossy black on the wings and tail. The head and upper part of the neck have no feathers and are of a dusky color. It breeds as far north as the southern limit of Illinois, and is an occasional summer-visitor farther north. See ADJUTANT-BIRD.


STORK

Storm, a violent disturbance of the weather, especially as regards wind and rain. By simultaneous observations of the barometer it has been found that the atmosphere of the earth is made of regions of high and regions of low pressure or, as they are called by meteorologists, anticyclones and cyclones respectively. It is the cyclones or regions of low pressure, rotating in the northern hemisphere in a direction contrary to the hands of a watch, that constitute most of our storms. In the United States these cyclones originate mostly in the region west and northwest of the Mississippi — between the Rocky Mountains and the Mississippi River or in the region about the Gulf of Mexico. Many of the storms of the Atlantic originate about the Gulf of St. Lawrence; while the storms of Great Britain take their rise mostly in the mid-Atlantic. From knowing the general trend and rate of motion of these cyclones and studying the latest telegraphic reports the weather-forecaster is able to predict all large storms with admirable and increasing accuracy. Thus the usual storm-track in the United States is to the east and over the Great Lakes to the Gulf of St. Lawrence. There is a great variety of local storms, as the *typhoon* of the China Sea and the waters about the Philippine Islands, the wind-storms of Arabia, the *blizzards* or heavy snow-storms accompanied by driving winds, tornadoes etc. The entire subject of storms must, however, be yet considered as an imperfectly understood department of the imperfectly developed but highly important science of meteorology. See Cyclone.

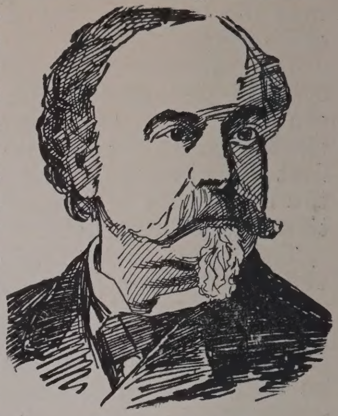
Storrs, Richard Salter, an American clergyman, was born at Braintree, Mass., Aug. 21, 1821. He studied at Amherst College and Andover Theological Seminary. He was pastor of the Church of the Pilgrims, Brooklyn, N. Y., 1846-99, having had one of the longest pastorates in the city. For a number of years he was one of the editors of *The New York Independent*, and was president of the American Board of Missions. He was noted for his eloquence and beautiful style in the pulpit and his aptness and readiness in occasional addresses, and ranked as one of the first pulpit-orators in America. His more important publications include a work on *The Divine Origin of Christianity*, *The Puritan Spirit*, *Bernard of Clairvaux* and *Forty Years of Pastoral Life*. He died on June 5, 1900.



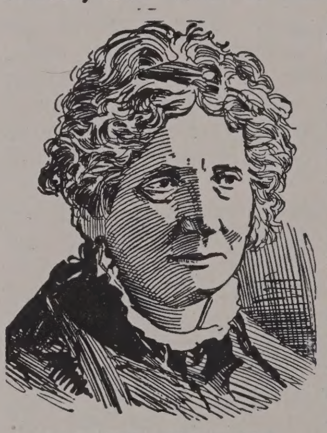
RICHARD S. STORRS

Sto'ry, Joseph, an American jurist, was born at Marblehead, Mass., Sept. 18, 1779. He was a graduate of Harvard. He was in the legislature in 1805, and in 1808 entered Congress. He was made a judge in the supreme court of the United States in 1811, holding the position for 34 years. In 1829 he became a professor in Harvard Law-School. He was an authority on all legal questions in the United States, his *Commentaries on the Constitution of the United States*, *The Conflict of Laws* and *Equity Jurisprudence* being very valuable. He died at Cambridge, Mass., Sept 10, 1845. See *Life* by his son.

Story, William Wetmore, American sculptor and poet, was born at Salem, Mass., Feb. 19, 1819, son of Joseph Story, and after graduating at Harvard studied law and was admitted to the bar. Among his works as a lawyer are *Reports of Cases*, *Treatise on the Law of Contracts*, *The Law of Sale of Personal Property* with *The Life of Story*. In 1848 he abandoned law for sculpture, and to assist him in his study of fine models he removed to Rome, Italy, where he afterwards chiefly resided, until his death at Vallombrosa on Oct. 7, 1895. His allegorical statues of *Cleopatra*, *Medea*, *The African Sibyl* and *Semiramis;* statues of George Peabody, Edward Everett and Francis Scott Key; and busts of Lowell, Bryant, Theodore Parker, Josiah Quincy and his father represent the bulk of his achievement in art. In literature he published poems, essays and rambles in Italy. The chief of these works which show his culture and sympathies are *Roba di Roma*, *Conversations in a Studio*, *The Castle of St. Angelo and the Evil Eye*, *Poems*, *Excursions in Art and Letters* and *A Poet's Portfolio*. He died in 1895.



W. W. STORY



HARRIET BEECHER STOWE

Stowe, Harriet Beecher, an American writer, was born at Litchfield, Conn., June 14, 1811. She belonged to the celebrated Beecher family, being the daughter of Dr. Lyman Beecher and the sister of Henry Ward Beecher. She was noted as a child for her fondness for writing, and at 12 astonished her teachers with a composition on the question: *Can the immortality of the soul be proved by the light of nature?* Moving to Cincinnati with her father's family. she there married Calvin E. Stowe, then a professor in Lane Theological Seminary. In that region and through the servants employed in her own family she learned much of the evils of slavery. Her husband's connection with many prominent abolitionists; his knowledge of the workings of "the underground railroad;" a pro-slavery riot in the city, when many of the intended victims were concealed and fed by herself and her friends; a sojourn of a brother in the south; and his observations on the slave-trade all helped to fit her for her work. Her first published volume was made up of sketches written for the papers and periodicals of the day, and was called

The Mayflower. In 1850 her busband became a professor in Bowdoin College, Brunswick, Me., and there the great American novel of *Uncle Tom's Cabin* was written. The characters were, many of them, taken from life, and many incidents were obtained from her brother's journal of his southern tour, and others from the lips of fugitives from slavery. The story appeared first as a serial in *The National Era* at Washington, D. C., and made a great sensation, bringing the author unexpected fame and undreamed-of financial returns. It was translated into many foreign languages, including Russian, Polish, Wendish, Armenian, Arabic, Chinese and Japanese, and has been brought out on the stage repeatedly. More than a million copies, probably, have been printed in the English language. Besides its power as a story the book had a strong influence in bringing about the Civil War, as it opened the eyes of the people to the evils of the system of slavery. Other works of Mrs. Stowe's are *Dred, The Minister's Wooing, Agnes of Sorrento, Oldtown Folks* and *My Wife and I.* She died at Hartford, Conn., on July 1, 1896.

Strachan, J., was born in Aberdeen, Scotland, in 1778 and educated at its grammar school there. He graduated at Aberdeen University, studied theology at St. Andrews University and came to Canada in 1799 to assume the principalship of a university which Governor Simcoe hoped to establish in Toronto. The plan fell through temporarily, and Dr. Strachan opened a school in Kingston and continued it for three years. He afterwards opened a school in Cornwall. In 1812 he was appointed rector of York, in 1818 given a seat in the executive council, in 1825 appointed archdeacon of York, and in 1839 was created bishop of Toronto. In 1840 he resigned from the legislative council. The province owes him a great debt. Through his energy Trinity College was given to Toronto.

Stradivari (*strä dē̇-vä′rē̇*) or **Stradivarius, Antonio,** a celebrated Italian violin-maker, was born at Cremona in 1644. Besides violins, he made viols, guitars and mandolins. His instruments are known for their finish and fine tone. He was the first to finish them neatly on the inside. The great care with which he selected and cut his wood, the study he gave to the shape and proportions and the luster of the varnish used combined to make an instrument without a rival. They are carefully preserved by those possessing them, and bring great prices, ranging from $1,000 to $3,000. Stradivari died at Cremona, Dec. 17, 1737.

Straf′ford, Thomas Wentworth, Earl of, an English statesman, was born at London, April 13, 1593. He entered Parliament in 1614. In the struggle with Charles I he sided with the opposition, against "not the king, but his evil ministers." In 1628 he was made president of the Council of the North by Charles I and in 1652 governor of Ireland. There is much difference of opinion as to his administration. His aim was to make the king absolute in Ireland, and his system, called "thorough" by himself and Laud, was severe. But he brought the country into a prosperity unknown before or since. He raised the revenue, improved the army, cleared the seas of pirates and introduced the cultivation of flax, which still is the most important industry of Ireland. In 1639 he became the king's principal adviser. When the Long Parliament met in November, 1640, he was charged with high treason and imprisoned. His guilt was not proved, the principal charge being his telling the king: "You have an army in Ireland that can reduce this kingdom," to which only one witness testified. But he was convicted as a man dangerous to the public liberties, and Charles gave his consent to the execution, not daring to refuse the popular clamor. He was executed on May 12, 1641. See *Life* by Foster in Eminent British Statesmen and Elizabeth Cooper.

Straits Settlements. See MALAKKA.

Strakosch (*strä′kosh*), **Clara Louise (Kellogg),** American operatic singer, was born at Sumterville, S. C., July 12, 1842, and received her musical education at New York, where she made her début at the Academy of Music in 1861. Pursuing her studies, she appeared in the season of 1864–5 as Marguerite in Gounod's *Faust*, as well as in *La Somnambula, Lucia di Lammermoor* and other operas, achieving great success. In 1867 she appeared also in England, where the wide range and perfection of her soprano voice attracted attention. Later on she organized an English-opera company, and with it appeared in the chief cities of this country and of Europe. Since her marriage to Mr. Strakosch, which occurred in 1887, she has appeared chiefly at concerts. Her repertoire once embraced about 40 operas.

Strass′burg (*Sträs′ boorg*) a city of France, the capital of Alsace-Lorraine, is on the Ill River, two miles from the Rhine. After the war of 1870 it was ceded with Alsace-Lorraine to Germany but after the World War (*q. v.*) it again became a part of France. The finest building in the city is the cathedral founded in the 11th century but not finished until the 15th. It is one of the finest Gothic churches in the world, with a spire of open-stone work 466 feet high, a magnificent rose-window 42 feet across, and in the minster the wonderful astronomical clock. Other fine buildings are the Protestant Church of St. Thomas, the palace, the library, the arsenal and the new university. The university was founded in 1621, and became famous, especially in medicine and the study of the languages, but was suppressed in 1790 during the French Revolution. In 1819 it was reëstablished by the union of two academies, founded in 1803 and 1808. In 1872 it was reorganized as a German university, with new buildings, laboratories, and a library of over 700,000 volumes, to replace the old one of 200,000 volumes which was entirely destroyed in the siege of 1870. Courses were included in philosophy, jurisprudence, theology and medicine. In 1931 there were 3,255 students.

As the town of Strassburg is situated near the borders of France, Germany and Switzerland, it has a large trade and a great variety of manufactures, including tanneries, foundries, chemical and locomotive works, piano and tobacco factories and many jewelry establishments.

Strassburg was colonized by the Romans during the reign of Augustus, and Emperor Julian here won a victory over the Alemanni in 357 A. D. It became a free town of the Holy Roman empire in the thirteenth century. In 1681 it was seized by the French and confirmed to them by the treaty of Ryswick. In 1870, after a siege of seven weeks, Strassburg surrendered to the Germans on September 28. It was returned to France after the World War. The population in 1931 was 181,465.

Stratford, a city and the seat of Perth County, Ontario, Canada, is situated on the Avon River, eighty-three miles southwest of Toronto. It is a railway and industrial center of growing importance, surrounded by rich farming-land. The city streets are well paved and lighted. There is an excellent school system, which includes a provincial normal school, a collegiate institute and a business college. There are several attractive parks. The building and repair shops of the Grand Trunk railway are located here. Its chief industries include the manufacture of flour, shoes, clothing, furniture, threshing machines, music cabinets, dairy supplies, bricks and tile, and corrugated drain pipes. The population in 1931 was 17,742.

Stratford-on-Avon (*ā'vŏn*), the birthplace of Shakespeare, a town in Warwickshire, England, is situated on the Avon river, twenty-two miles southeast of Birmingham. "Shakespeare's house," where the poet was born, is situated on Henley Street. It is the property of the government, having been bought in 1847 for £3,000 ($15,000). Shakespeare had purchased the "New Place" in 1597, and died there on April 23, 1616. A vicar of Stratford razed it in 1759, and cut down the poet's mulberry tree. The site, however, has been government property since 1861. The old guild-hall was restored in 1892, and is occupied by the grammar-school of King Edward VI, where Shakespeare was educated. The beautiful old cruciform church, with Shakespeare's and Anne Hathaway's grave, also contains an American stained-glass window representing the "Seven Ages." The Shakespeare fountain was presented by George W. Childs, an American, in 1887, and Shakespeare Memorial Theater which seats 800 spectators, was built in 1877-9. Anne Hathaway's cottage, situated near by, also belongs to the nation. It was one of Shakespeare's favorite haunts and a picturesque goal for tourists. The garden, thatched roof, low doorway, heavily-beamed ceilings, wide fireplace and furniture are preserved as they were in the days of young Will and Anne. The cottage of his mother, Mary Arden, is in the vicinity. The city also boasts the Harvard House, the birthplace of the mother of John Harvard, who founded Harvard University in the United States. Stratford-on-Avon is an important agricultural center, but its prosperity depends largely on the visitors, who number 20,000 or more every year. The population of Stratford-on-Avon in 1931 was 12,344.

Stratford (*străt'fẽrd*) **de Redcliffe,** STRATFORD CANNING, a British diplomat and viscount, was born at London, on November 4, 1786. The influence of George Canning secured for him in 1808, the position of secretary of the Embassy in Constantinople, and in 1810 he succeeded to the post of Minister Plenipotentiary. In 1812 he negotiated the treaty between Russia and Turkey, which released the Russian army of the Danube in time to attack Napoleon on his retreat from Moscow. He was minister to the United States during 1819-23. In 1825 he was again sent to Constantinople. In 1831 he was sent there on a mission to draw the boundaries of the new kingdom of Greece. From 1842 to 1858 Stratford was again Ambassador at Constantinople. Here his influence was so great as to gain him the name of *The Great Elchi.* He induced the Sultan to begin a series of reforms, which improved the condition of the native Christians. He made every effort to prevent the Crimean War. He retired from public service at its close and died on August 14, 1880. He wrote some verse, and after his death extracts from his papers and correspondence were published under the title, *The Eastern Question.*

Strathcona and Mount Royal, DONALD ALEXANDER SMITH, **Baron,** a statesman and the high commissioner for Canada at London, was born in Archieston, Scotland in 1820. Early in life he entered the service of the Hudson Bay Company, and was the last resident-governor of that fur-trading corporation. For a time he represented Selkirk, Manitoba, in the Dominion Parliament and was a director of the Canadian Pacific Railroad Company. In the Boer War he raised the Strathcona Horse for service in South Africa, equipping 500 men at his own expense. He was known for his active philanthropy. To him, largely, is due the development of Canadian Railways, and advance in education. In 1896 he endowed Royal Victoria College in Montreal, and in 1903 he became chancellor of Aberdeen University. He died in London on January 21, 1914.

Stratosphere Flights. Several attempts have been made during the past seven years by aeronauts to ascend into the stratosphere to determine the highest point that a gas balloon will lift man into thin air and pursue scientific exploration of the upper atmosphere. It is generally believed that the stratosphere, where arctic temperatures prevail, begins about nine miles up. Two of these expeditions ended disastrously and brought death to the aeronauts.

The first stratosphere flight occurred in 1927. In that year Captain Hawthorne Gray of the United States Army ascended to a height of eight miles. Captain Gray, however, died in the descent of the balloon from the effects of the thin air. Four years later, on August 27, 1931, Professor August Piccard of Belgium ascended from Augsburg, Germany, accompanied by Mr. Charles Kipfer. On this flight the Belgian scientist from the University of Brussels, surpassed the previous record of 43,000 feet, which had been made in an aeroplane, by invading the upper atmosphere to a height of 52,000 feet, or 9.8 miles. One year later Professor Piccard made his second ascension into the stratosphere, this time accompanied by his capable assistant, Max Cosyns. The ascent was made from Zurich, Switzerland, in the first air-tight metal ball which had ever been used by any scientist to invade the heavens. In this metal compartment, measuring seven feet in diameter, Professor Piccard, protected from the thin air and cold, by being hermetically sealed in the ball with an artificial supply of oxygen, ascended ten miles, breaking his own record of the previous year. He landed near Densenzoono, Lake Garda, Italy.

The next attempt to set a new record in ascent was made on September 30, 1933. Three Russian aeronauts ascended from Moscow in an aluminum ball hooked to a balloon. The leader of the expedition was Ernest Birnbaum, assisted by Georgi Prokafiev and Konstantin Gudenoff. After eight hours and nineteen minutes in the air, the *Stratostat*, U. S. S. R., descended to earth. Their instruments revealed that a height of 11.8 miles (19,000 meters) had been attained. A new record was not established, however, in that the Soviet Union is not a member of the *International Federation Aeronautique*, the recognized authority "on the veracity of aeronautical manoeveurs." Such being the case, Professor Piccard's record of 53,153 feet or ten miles, established in 1932, was retained as the stratosphere record.

One month later a new height was attained by Lieutenant Commander T. G. W. Settle of the United States Navy and Major Chester L. Fordney of the Marine Corps. Lieutenant-Commander Settle made several attempts at the flight before he was successful. Unfavorable weather conditions prevented his ascension on several occasions. He had originally intended to begin the flight on November 10, 1933, from the grounds of a Century of Progress in Chicago, but a northwest wind arose shortly before the takeoff and Lieutenant-Commander Settle was again forced to postpone his flight. On August 5, 1933, he made his first attempt to ascend into the stratosphere, aided by Jean Piccard, a noted chemist and twin brother of Professor Piccard of Belgium, making an auspicious start before an anxious throng at Soldiers' Field in Chicago. Upon this expedition he had ascended only 5,000 feet when he was forced to land in a railway yard near the Chicago River because of trouble in a gas release valve. His next flight was scheduled for November 10, of that same year the takeoff to occur at the grounds of a Century of Progress in Chicago. Weather conditions again halted the ascension. On November 20, however, the two aeronauts took off from Akron, Ohio, in a 600,000 cubic foot bag. It was on this flight that a new stratosphere record was established. Lieutenant-Commander Settle and Major Fordney ascended 61,237 feet into the thin air, thus surpassing the height attained by Professor Piccard in 1932, of 53,153 feet. The two American aeronauts brought their balloon safely to earth near Bridgeton, New Jersey, after establishing a new record and completing cosmic ray investigations in the upper atmosphere.

It was on January 30, 1934, that three Russian aeronauts, Paul Fedeseemko, André Vasenko and Ilya Oususkin, crashed to their death in a stratosphere balloon near Potisky Ostrog, 150 miles east of Moscow. The Soviet balloon, the "Syrius," started up on the morning of that day from the Frunze military airdrome at Maxilova a short distance from Moscow. Within three hours the balloon had ascended 72,178 feet approximately 13.67 miles. A previous unofficial record had been made by the U.S.S.R. the balloon of the Red Army which reached an altitude of 62,230 feet in September, 1933. The crew of the "Syrius" had been training for several months for their attempt to establish a new altitude record under the auspices of the Soviet Air League (*Osoviakhim*). The balloon had been constructed by André Vasenko. The pilot and commander of the flight was Paul Fedeseemko. The flight was undertaken on January 30, as a special feat in honor of the All-Union Congress then in session in Moscow.

Reports of the progress being made in the stratosphere were continuously relayed back to earth by radio. Shortly after noon on that day the descent was begun. Five hours later the gondola and balloon and the mutilated bodies of the three aeronauts were found near Potisky Ostrog. An investigation revealed that the bag had been torn from the gondola in the descent to earth.

The altitude record established by the "Syrius," although setting a new high, is an unofficial record since the Soviet Union is not a member of the *International Federation Aeronautique*. The official record for stratosphere flights was established on November

21, 1933, by Lieutenant-Commander T. W. G. Settle of the United States Navy, and Major Chester Fordney when they ascended 61,237 feet, approximately 11.6 miles.

Early in 1934 plans were put under way by the National Geographic Society—United States Army Air Corps for a stratosphere flight in which Captain Albert W. Stevens, army ace photographer would attempt to set a new official stratosphere record. Major William E. Kepner was named as pilot of this proposed expedition. The flight was planned for the summer of 1934. At this time Captain Stevens was stationed at Wright Field in Dayton, Ohio. He is well known throughout the world for high altitude flying and photography. In 1922 he made a parachute jump from a height of 24,000 feet. In 1924 he spent ten months in air exploration in the Upper Amazon Basin with the Hamilton Rice expedition. Captain Stevens has become world famous for his long-range photography. In 1929 he won the Mackay Trophy award for his 14,000 mile aërial photographic tour of the American Northwest with Lieutenant J. D. Corkville. While stationed at Wright Field just prior to the stratosphere flight Captain Stevens devoted himself to perfecting and modifying the scientific instruments which were used on this expedition.

At 5:45 a. m. on July 28, 1934, the three intrepid balloonists began their ascent into the stratosphere from Moonlight Bowl, a short distance from Rapid City, South Dakota, in the largest free balloon ever constructed. The expedition seemed fated to be one of the most grim gondola dramas ever recorded since the first flight to the stratosphere in 1927. This adventure is outstanding among all attempts to soar into the thin air since it was the first such drama ever broadcast over the radio to a vast tense audience waiting below on earth.

The three aeronauts, Major William E. Kepner, pilot, Captain Orvil Anderson, and Captain Albert Stevens, had hoped to ascend 77,000 feet into the upper atmosphere. The flight was made in a 3,000,000 cubic-foot hydrogen balloon. A nine-foot enclosed gondola housed the scientific apparatus with which it was planned to make observations. A new device for making the descent to earth safer than heretofore had even been perfected. Captain Stevens designed a new device to provide compressed air-brake release for the valve ropes above the gas bag. In all previous flights this release could only be accomplished by thrusting the hand through an open port-hole. By means of this new device the air-tightness of the gondola was assured.

After the balloon had penetrated the upper atmosphere to a height of 60,000 feet, ten hours after the takeoff from Moonlight Bowl, the mammoth bag crashed to the earth, forcing the three army aeronauts to take to parachutes and leap for their lives. As the balloon soared into the heavens, cross currents of air ripped the gas bag, some of the holes measuring fifty feet long. The temperature at this point, 11.2 miles into the stratosphere, registered fifty-eight degrees below zero Centigrade (approximately seventy-two degrees below zero Fahrenheit). Although falling rapidly, the three flyers did not crash upon the earth until two hours and thirty-five minutes after the beginning of the descent. It was reported that the rate of descent was 500 feet per minute. The trapped men worked frantically to save their instruments, valuable scientific apparatus on which was recorded the history of their adventure into the heavens. The spectograph and other instruments were placed in a basket, and dropped to earth in a parachute.

At a height of 8,000 feet the gondola tore loose from the flapping bag and the three daring men crawled on top of the huge metal ball and attempted to release the giant parachute with which the sphere was equipped but their efforts were wasted. One by one the men leaped from the gondola. Captain Orvil Anderson jumped at 5,000 feet; Captain Albert Stevens, scientific observer, dropped to earth at 3,000 feet; and Major William E. Kepner, pilot, the last to leave the ship, jumped at 500 feet. All three aeronauts landed safely. The huge free balloon crashed to earth just twelve miles northwest of Holdredge, Nebraska, at 3:49 p. m. Thus ended another, the seventh, attempt to invade the stratosphere in a battle with the elements.

Straus (*strous*) **Nathan**, a prominent American merchant and philanthropist, was born in Rhenish Bavaria, in 1848. When but a lad of six years of age, Nathan's parents left their home in Germany and brought their family to the United States. Here the elder Straus developed an importing business in which Nathan, after reaching manhood, was employed. In later years he became associated with his brothers, Isidor and Oscar S., in the firm of R. H. Macy and Company of New York, and the Abraham and Straus Department Store of Brooklyn.

Nathan Straus began his philanthropic work by establishing a system in New York by which sterilized milk was distributed among the children of the poor. He also established a system of coal depots for these poor folk. Both of these systems were maintained by him during his lifetime. Nor were his philanthropies confined to the United States. In 1912 soup kitchens were established in Jerusalem under his supervision, and a health bureau was instituted in Palestine to aid in stamping out the malaria which was so prevalent in that country. In 1928, on the occasion of his eightieth birthday, the aged philanthropist helped to relieve the tense unemployment situation in Palestine by subscribing monetary aid. It was Nathan Straus who, in 1929, financed the journey of Dr. John Haynes Holmes to the Near East so that the latter might study that region preparatory to his lectures on "Peace and Unity Among the Nations of the World." He died in 1931.

Straus (*strous*), **Oscar Solomon,** an American merchant and diplomat, was born at Otterberg, Bavaria, in 1850. In 1854 his family emigrated to the United States and he was educated at Columbia University. With his father, he made wholesale importations of pottery and glassware. In 1887 he became minister to Turkey where his distinguished services earned re-appointment in 1897. In 1902 he became a member of the Court of Arbitration at The Hague. In 1907 he was appointed Secretary of Commerce and Labor. Among his works are *Roger Williams the Pioneer of Religious Liberty; The American Spirit,* and *Reform in the Consular Service.* He died in 1926.

Strauss, David Friedrich, a German author, was born at Ludwigsburg in Württemberg, on January 27, 1808. He began life as a country pastor, but after a year became professor in a seminary, and then went to Berlin for study. While teaching and lecturing at Tübingen, he published his *Life of Jesus* (1835), which aroused great excitement throughout Germany and resulted in his dismissal from his position. His next publications were defenses of his work, which were followed by his second great work *Christian Doctrine of Belief.* He published lives of Schubert and Ulrich von Hütten, brilliant lectures on Voltaire and a new *Life of Jesus* (1864). *The Christ of Faith* and *The Old and the New Faith* are his latest works. His style of writing places him very high among German writers. He died on February 8, 1874.

Strauss, Johann, a noted Austrian composer and conductor, known familiarly as "The Waltz-King," was born at Vienna, on October 25, 1825. He came of an eminently musical family, his father being a noted musician and composer, while two of his brothers were composers of dance-music. On his father's death he became conductor of the orchestra, with which he toured the world. From an early age, he had composed waltzes and operettas, which have been very popular. In 1872 he conducted an orchestra of 1,000 performers at the Boston Peace Jubilee. For a time he was musical director to Emperor Joseph at Vienna. Of his 152 waltzes, *The Beautiful Blue Danube* is the best known. He died on June 3, 1899.

Strauss, Richard, a distinguished German composer and conductor was born at Munich, Bavaria, in 1864. His father was the finest horn-player of his day. Strauss composed his first symphony at the age of sixteen. In his earliest years Strauss was musical director at Meiningen. He became chapel-master twice at Munich, and then at Berlin. Afterward, he occupied himself as a composer of the ultra-modern school. His chief symphonic works include *Italia* (a fantasy), *Don Juan, Macbeth, Death and Apotheosis, Don Quixote, Thus Spake Zarathustra* and *A Hero's Life.* He has also published many songs, and the noted operas, *Guntram, Feuersnot* and *Salome,* adapted from Oscar Wilde's text, which reveal his special gifts as an imaginative and daringly original composer. In 1905 and 1921 Strauss paid professional visits to the United States, where he conducted many of his more popular compositions. Critics differ as to the melody and value of his work, but all acknowledge his unusual mastery of orchestration.

Straw, the stem of grasses such as wheat, oats and barley. It is used on farms for feeding and for bedding animals. Its chief use in the arts is in making paper and hats. Wheat-straw is chiefly used for plaiting. The finest straw-plaits are made in Tuscany, from whole wheat sown very thickly, pulled up and cut off by hand for threshing. Large quantities of straw-plait are also exported from Canton, China. Panama hats are made from straw from the leaves of a palm, braided by the Indians in South America.

Strawberry, and species of *Fragaria,* a genus of the rose family, which contains about twelve species, found in the temperate regions of the northern and southern hemispheres. The fruit is a much enlarged and fleshy receptacle, in the surface of which the very small, seed-like akenes are imbedded. The strawberry is comparatively recent in cultivation. It is said to be the most important of the small fruits in America. The commercial varieties have been derived from the alpine strawberry of the eastern United States, the Chilean strawberry and the hautbois.

Streator, a city in La Salle County, Illinois, is situated on both banks of the Vermilion River, in the center of a productive agricultural and coal-mining district, ninety-two miles southwest of Chicago. It is served by five railways. Notable buildings include St. Francis Convent and School, the Masonic Temple, the public library and the city hall. It is a shipping point for large quantities of coal. Its industries include foundries and machine-shops; flour and planing mills; brick, tile and sewer-pipe works; corn-canning; manufacture of flint and Bohemian ware, window and rolled plate glass; automobile and automobile accessories and locomotive-repair shops. The population in 1930 was 14,728.

Street, Julian, a noted American author, was born at Chicago, Illinois, in 1879. After completing his education he became a newspaper reporter in New York City in 1899. He wrote a dramatic column for the paper in 1900-1901. In 1925 Julian Street was awarded the O. Henry Memorial Prize for short stories. Among his most outstanding works are: *My Enemy the Motor* (1908); *Welcome to Our City* (1913); *The Most Interesting American* (1915); *Rita Coventry* (1922); *Mr. Bisbee's Princess* (1925), and *Where Paris Dines* (1929).

Street-Railway. See Electric Railways.

Strength of Materials, the resistance which materials offer to changes in form, such as elongations, compression, bending and twisting. Such changes are called strains, and the resisting force of the material is called a stress.

In the use of materials for a structure or a machine it is all-important to the designer to know how much strain a given force will produce, whether the material will recover from the strain when the straining-force is removed, and how great the strain can be before breaking takes place. A structure must be designed so as to withstand without permanent set the loads that it is to carry. In most cases it is equally important to determine what is the least amount of material which can be safely used under the given conditions. Experiments to determine these facts cannot be made on the completed structure, for, while tests of complete structures are important, they cannot reveal all that is necessary to know and, besides, would be an expensive way of determining safety-limits. But by analysis of the forces and loads the designer can, even in complex structures, as bridges and roofs, reduce the forces to comparatively simple straining actions in the individual parts, so that he can make his plans from the results of experiments on the materials used. Such experiments are called tests of strength of materials, and the machines for making the tests are called testing-machines. (See TESTING-MACHINES.) The behavior of materials under loads is that, under any load, there is a strain (elongation, compression, bending, twisting etc.), and there is developed at the same time a stress-resisting force which tends to restore the material to its original form. In 1676 Robert Hooke first stated his law that in elastic materials the stress is proportional to the strain, a law which is assumed to be strictly true for structural testing. The ratio between the stress and the strain is called the coefficient of elasticity. For practical purposes there are as many kinds of coefficients as there are kinds of strain, as coefficient of tension, of compression, of bending or of torsion. As long as Hooke's law holds, the material regains its original form as soon as the straining-force is removed. But if the strain goes beyond a certain amount, depending on the material, the material remains permanently deformed or set, and we say it has been strained beyond "the elastic limit." In engineering-work it is very important that no part of a structure or machine shall be strained beyond the elastic limit. If the load be still further increased, the material will break under the load, and we have the breaking-force or "ultimate strength of the material." From the above it is seen that the important tests which are commonly required are (1) amount of elongation, of compression, of bending and of torsion produced by different forces; (2) elastic limit in each case; and (3) the ultimate strength or breaking-force in each case. Stresses and straining-forces are, in British and American engineering practice, stated in pounds per square inch. We can thus express the average tensile strength of timber as 10,000, of cast iron as 20,000, of wrought iron as 60,000 and of steel as 100,000 or over, meaning so many pounds per square inch cross-section. The strength of any material depends not only on the composition of the material but on its physical condition, the treatment it has undergone, the way the load has been applied, and in every case a wide margin must be allowed between the possible loads as shown by the tests and the actual loads and for conditions which cannot be fully taken into account. The term "factor of safety" is used to express this relation between working loads and theoretically possible loads. Thus for a working tensile strain, one fifth of the ultimate strength may be used for good wrought iron or the "factor of safety" is five. Besides the tension, compression, bending and torsion tests, there are a number of other tests which are made on materials for special purposes, as tests on paving-bricks for hardness and durability, tests of cements and limes. For detailed information on the strength of materials and testing consult Unwin's *Materials of Construction* or Merriman's *Mechanics of Materials.*

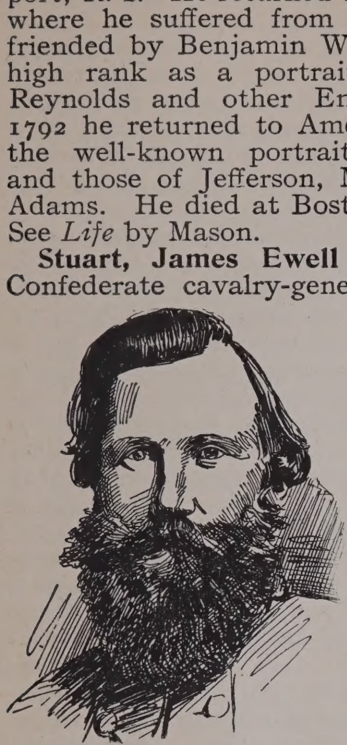
Strikes. See LABOR, LABOR-ORGANIZATIONS and TRADE-UNIONS.

Strobilus (*strō-bī'lŭs*) (in plants), a name given to the cone-like cluster of sporophylls which is best displayed by equisetums, club-mosses and gymnosperms. In gymnosperms it often is called a flower, and it really stands for the flower in plants without floral leaves. It probably is the structure from which true flowers have been derived.

Strych'nine. See POISONS.

Stu'art or **Stew'art,** the name of a royal family of Scotland and England. The name is derived from the office of steward of Scotland, which was given to one of the family by David I, king of Scotland, and became hereditary in the family. The family is of Norman origin, the first ancestor in England receiving lands from Henry I. The marriage of Walter, the sixth steward of Scotland, in 1315 to Marjory, daughter of Robert Bruce, brought the crown of Scotland to the Stuarts. "It came with ane lass," said James V. Robert II, the son of Walter Stewart and Marjory Bruce, came to the throne in 1317 as the first of the Stuart kings. Between 1371 and 1714 14 Stuarts sat upon the Scottish, and six of these also on the English, throne. The last Stuart sovereign was Queen Anne. The house of Hanover, to which the present ruling family of England belongs, is connected with the Stuart family through Sophia, Electress of Hanover, who was the granddaughter of James I. See *The Royal House of Stuart* by Gibb and Skelton.

Stuart, Gilbert Charles, an American painter, was born at Narragansett, R. I., in 1755. He studied at Edinburgh, worked his passage home, and began painting at Newport, R. I. He returned to London in 1775, where he suffered from poverty until befriended by Benjamin West. He gained a high rank as a portrait-painter, rivaling Reynolds and other English artists. In 1792 he returned to America, and painted the well-known portrait of Washington and those of Jefferson, Madison and John Adams. He died at Boston, July 27, 1828. See *Life* by Mason.


GEN. J. E. B. STUART

Stuart, James Ewell Brown, a noted Confederate cavalry-general, was born in Patrick County, Va., Feb. 6, 1833, and died from mortal wounds at Richmond, Va., May 12, 1864. His early career was spent as a mounted rifleman in Texas and Kansas, engaged in Indian warfare. When the Civil War broke out, he held a captaincy in the regular army, but resigned this to enter the Confederate service, in which he became the most distinguished of cavalry officers in the army of northern Virginia. He took part in the battles of Bull Run, Antietam and Fredericksburg, and conducted raids through the Shenandoah valley and into Pennsylvania. Being promoted to the rank of major-general, he was assigned to the command of the cavalry in Lee's army and did good service for the Confederacy in the battles of the Wilderness. He covered the retreat after the battle of Gettysburg, and was mortally wounded at the battle of Yellow Tavern against the forces under Gen. Philip H. Sheridan. See McClellan's *Life of Major-General J. E. B. Stuart.*

Stubbs, William, an English historian, was born at Knaresborough, June 21, 1825. He studied at Oxford, and became a clergyman, settling at Navestock, Essex, in 1850. In 1866 he was appointed professor of modern history at Oxford. He was made bishop of Chester in 1884, and changed to the see of Oxford in 1889. His writings are historical, and are marked by great learning and rare impartiality, and hold the highest rank in English history. He edited a large number of medieval histories and chronicles as *Chronicles of Edward I and Edward II*. His historical works include *Constitutional History of England, The Early Plantagenets*, in the Epochs of Modern History Series, and *Seventeen Lectures on the Study of History*. He died on April 22, 1901.

Study, How to. The importance of this problem is indicated in the fact that one's attitude toward study and toward school in general is greatly dependent on his method of study. If there be friction in the process, one dislikes study and school and drops out of the latter early. But if little friction is present, so that the work is agreeable, one is likely to be a student and become well-educated.

The problem is seen to be more serious still, when it is recalled that very young people study in such a way that they gradually lose their native energy to think and act independently. One can easily spend so much time collecting ideas of other people, that he finally has no ideas of his own. Indeed, this tendency is common. Thus in the very process of being educated the native self is undermined and weakened. The real object of study, on the other hand, is not merely to collect; a new mass of facts can only submerge and destroy individuality. But the object is to use facts and ideas merely as means of nourishment. They are the food by means of which mental and spiritual ability is developed, as meat and bread are the means by which the physical body is developed. A power of consumption of ideas, therefore, that insures good assimilation is of the highest importance to every young person.

What, then, are the precautions that should be taken to bring this about?

In the first place, something should be done to overcome the comparative helplessness characteristic of a large percentage of school-children, when they meet intellectual difficulties in their studies. The remedy for the evil is much greater initiative on the part of children during the recitation. So long as the recitation continues to be what it has usually been, *i.e.*, a period where the teacher entirely assumes the initiative and children are wholly followers, helplessness on the part of pupils must be expected. On the other hand, if children are to become independent in mental work, they must be left alone more of the time, or at least must *lead*, rather than follow, in the recitation of lessons. This means that many of the recitation periods — possibly the greater part of those in the elementary school — should be spent by pupils, not merely in reciting, but in mastering lessons in the teacher's presence and under the influence of her suggestion. In other words, many of these recitation-periods should rather be *study-periods*, in which pupils study aloud before their teacher, thus taking the lead in such work and revealing their method of procedure for correction. This presupposes the teacher's willingness and ability to keep still much of the time, not altogether an easy task, and also a change of aim for much of the school-work. Ordinarily that object is knowledge of the various studies; in such work as this suggested, however, it would be knowledge of how to study, a very difficult thing.

Teachers may be willing to practice silence in class and to accept development of initiative on the part of their pupils as a very prominent aim. But until the children themselves become clear in regard to the direction in which initiative is to be exercised, they are likely themselves to be provokingly silent. What, then, are the further principal factors in proper methods of study?

Both children and college students generally recognize two main factors in study — *i. e.*, memorizing and thinking. Which should come first is the next important question to be met. Custom says: Memorizing. "Fix the facts or thoughts in memory, then reflection upon them can follow at leisure" is the common thought. But there are always more duties in life than time allows us to perform, so that reflection is habitually postponed until it is omitted. In consequence, to the great majority of persons, studying signifies mainly the stultifying work of memorizing. Suppose now, this order were inverted, and young people were taught to undertake, first, whatever thinking was expected of them in each lesson. They would then at least make sure of the more interesting part. But, more than that, thinking thoughts through, in the various ways required in good study, is the very best method of memorizing them, and psychologists recommend this method even in the case of *verbatim*, *memoriter* work. Conscious effort to memorize would then be largely or wholly unnecessary, because the memorizing would become a by-product of thinking instead of a substitute for it. Here is a very important fact to be taught to young people about how to study. If it were applied, there would need to be less of dull drill in school; one reason for so much of it now is that there is so little thinking. Some drill might still be necessary, but by coming after most of the thinking, the motive for it would be made plainer and it would be less wearisome.

What kinds of thinking are to be expected is the next important question. The remaining principal factors in study might well be expected to be the principal factors involved in thinking.

First of all comes the selection of what is relatively most valuable. There always is a tendency for young people to regard ideas as all on the same plane of work, and many teachers encourage rather than overcome this tendency. It is encouraged by assigning lessons by pages, and then requiring practically everything to be reproduced in class. It is encouraged, also, by allowing facts to be reproduced in the order in which they have been presented in the text, since this method emphasizes again the importance of *everything*.

To combat this tendency it is well to require pupils or students to recite by topics or points rather than by pages; to take up first what they consider the most important thought in the lesson, even though it happen to come last in the work; to suggest marginal headings and even write them into the margin if they own books. By such means the habit of watching for the main issue or issues can be inculcated.

Directly connected with this should come training in the habit of overlooking or neglecting what is relatively unimportant. A pupil who has so good a memory that he reproduces practically everything in a lesson seldom deserves praise. Such a memory merely relieves him from the necessity of thinking enough to discriminate between what is especially valuable and that which is insignificant. Some clearness as to the meaning of *thoroughness* in study is here involved. So long as young people are brought up with the idea that thoroughness means attention to *everything*, recognition of relative values will be wanting. A pupil should be now and then condemned, therefore, for paying attention to what is not worth the time. You cannot teach emphasis of some parts without presupposing neglect of others, for the two are correlatives.

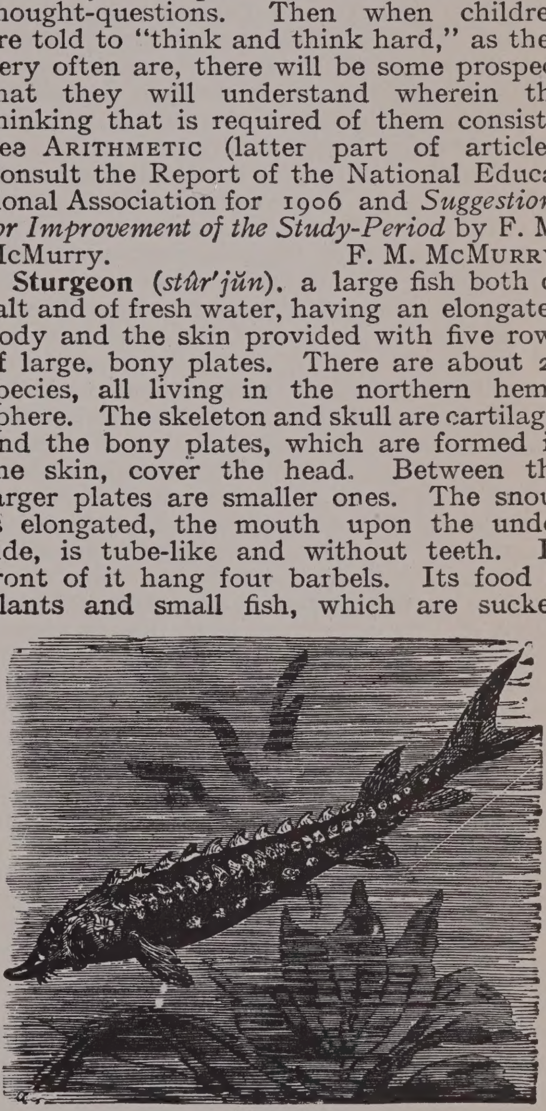
The outcome of good training in these two directions should be a habit of seizing quickly on the main ideas presented and of grouping the details bearing intimately upon them around the central thoughts. That would mean organization of thought, a most valuable factor in proper study. Not only should relative values thus always be very prominent in study, but the soundness, in final value, of ideas in life should also be considered. Many persons have a profound respect for print, and willingly try to hold as valuable whatever they find in a text. But from childhood good judgment in this direction should be developed, and such attempts should be a part of a teacher's work, who is endeavoring to instruct pupils in the art of study. How often are newspaper and magazine articles, as well as whole books, unworthy of perusal! Young people must be trained, therefore, not only to judge what is relatively most valuable among a lot of ideas and facts, but what is valuable for life or lacking in such worth. In other words, they must practice judging practical worth, must be made critical to this extent, and learn to believe in their right and ability in this direction. This is nothing more than saying that children and college-students should develop independent judgment or be made self-reliant and sensible.

Intimately related to this last factor of study is the need of finding the specific bearings or relation that a given topic has for daily life. It is very common for students to store facts for distant, future use without reference to actual life at the present time. But that attitude is certainly wrong. Knowledge cannot be judged and digested till its relation to life is seen. The standard for passing judgment on values is found in life itself. Another way of expressing this thought is to say that the student should conceive specific purposes which the ideas he is studying along a given line are likely to further. This is by no means an easy task, but it is an important one. A person who habitually reads a book or magazine article without thought of any effect it may bring about either in topics for conversation or journeys that he may take hardly has the right method of study. This does not signify that one should never read for the "mere momentary tickle" or that he should always be strictly critical. But it does signify that the purpose of ideas is found in their expression and that, unless one develop the habit of teaching what he learns to the point of its contact with life at home, on the street and elsewhere, he is like the miser in hoarding wealth without reference to its use. It is the wrong habit of mind for the student. Thus he should not only *judge the value* of thought, but should form the habit of *using it*.

Still another factor of study is the work of supplementing an author's statement. Even the best of authors fail to put most of their ideas into print, or, as Ruskin puts it, all literature — like the story of the Prodigal Son — appears practically in the form of parables, requiring much supplementing in order to be properly pictured and interpreted. The words in a minister's text in comparison with those in his sermon are perhaps as one to a thousand. The statements in any text should bear a somewhat similar ratio to the thought that they suggest in the reader's mind. Accordingly, much time should be occupied by children in school in vizualizing in greater detail and reflecting upon the scenes in geography, history and other English. To this end, questions testing mainly memory are out of place; questions involving reflection should be common, if young people are to become reflective. Again the initiative, it should be remembered, should come from the children. A very common remark from the teacher, in the treatment of text, might well be: "Do we need to stop here in order to talk over any matter?" The children should even learn to call a halt themselves at fit places and to offer the supplemental thought without even a suggestion from the teacher.

These are some of the more important factors in proper study, very briefly presented. Children in the elementary school should be acquainted with these in their application, as they should be taught the principles of arithmetic. The teacher should always bear in mind that the main part of proper study is *reflection;* is *thinking*, rather than memorizing. Some one has declared that the good reader spends at least as much time reflecting on what he reads as he does in the actual reading. That is a valuable suggestion. But if such a habit of study is to be brought about, the teacher must watch the character of her question. The vast majority of questions put by teachers to-day are out-and-out memory questions, *i. e.*, they tax memory primarily. In place of these must come thought-questions. Then when children are told to "think and think hard," as they very often are, there will be some prospect that they will understand wherein the thinking that is required of them consists. See ARITHMETIC (latter part of article). Consult the Report of the National Educational Association for 1906 and *Suggestions for Improvement of the Study-Period* by F. M. McMurry. F. M. McMURRY.

Sturgeon (*stûr'jŭn*), a large fish both of salt and of fresh water, having an elongated body and the skin provided with five rows of large, bony plates. There are about 20 species, all living in the northern hemisphere. The skeleton and skull are cartilage, and the bony plates, which are formed in the skin, cover the head. Between the larger plates are smaller ones. The snout is elongated, the mouth upon the under side, is tube-like and without teeth. In front of it hang four barbels. Its food is plants and small fish, which are sucked into the mouth. The common sturgeon is found on both sides of the Atlantic and ascends rivers to spawn. It reaches a length of eight to twelve feet on the Atlantic coast, and is larger in European seas. It ascends the Hudson to Albany, and its red flesh is jocularly called Albany beef. The shovel-nosed sturgeon and the lake sturgeon are common in the great lakes and waters of the Mississippi valley. They do not


STURGEON

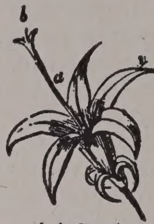
enter the sea. A sturgeon of the Pacific coast reaches a weight of 600 pounds, but the largest of all inhabit rivers flowing into the Caspian and Black Seas. They are known as *hurso*, and reach a length of 25 feet and a weight of nearly 3,000 pounds. The sturgeon's air-bladder is the principal source of isinglass and the roe of caviar.

Sturgeon Falls, Can., on Sturgeon River, Nipissing District. New Ontario, on the main line of the Canadian Pacific. The water-power at this point has been developed to 10,000 horse-power. The pulp and paper mills of the Imperial Paper-Mills Company are here. They employ 1,500 hands. The nickel-belt extends within a few miles of the town. A refining and reducing plant is being erected. Extensive saw-mills are here, and the fishing industry is important. Population 3,500.

Stuttgart (*stŏŏt'gärt*), a city of Germany. is the capital of Württemberg. It is about two miles from Neckar River and 127 southeast of Frankfort, and is surrounded by hills, which are covered with vineyards. gardens and beautiful houses. Near Palace Square, in the center of the city, are the old castle, belonging to the 16th century, the new palace, the theater, academy, the jubilee column (1841), a statue of Schiller and the railroad-station, which is one of the finest in Germany. There are a famous polytechnic school, a conservatory of music, a museum and art-gallery and the royal library of over 500,000 volumes, including a fine collection of 7,000 Bibles. Stuttgart has one of the largest book-trades in Germany, and manufactures beer, pianos, chemicals, chocolate and furniture. Its fairs for the sale of books, hops, cloth and horses are celebrated. It has been the capital of Württemberg since 1842. Population 285,589.

Stuyvesant (*stī've-sant*), **Peter,** the last Dutch governor of New York, was born in Holland in 1592. He was in the army in the West Indies, became governor of Curaçoa, and lost a leg in the attack on St. Martin. He was made director-general of the New Netherlands, as the country was then called, in 1646. He was conciliatory toward the Indians and just toward his subjects; but, when a convention demanded that "no new laws should be enacted but with the consent of the people," Stuyvesant commanded the separation of the assembly, saying: "We derive our authority from God and the Company, and not from a few ignorant subjects." In 1650 he helped to decide the boundaries between the Dutch and English possessions, and in 1655 took the region around the Delaware from the Swedish settlers. When the English war-ships in 1664 appeared before New Amsterdam (New York), he was obliged to yield to the will of the people and surrendered the city, the treaty being signed on Sept. 4, 1664, in Stuyvesant's house on his farm, known as the Great Bowerie, from which the Bowery in New York received its name. He lived 18 years after the surrender on his farm, where he died in August of 1672. See *History of New York* by Martha J. Lamb and *Knickerbocker's History of New York* by Washington Irving.

Style (in plants), that part of a carpe which rises from the ovary as a more or less elongated beak, and bears the stigma. It relates the stigma properly to pollination. It usually is a slender cylindrical body, but it often is much modified in form, as in the common iris or flag, in which it resembles a small petal. In case the style is lacking, the stigma is said to be sessile on the ovary. See FLOWER.



(*a*) Style.
(*b*) Stigma.

Stylites (*stī'lī'tēz*), **Simeon,** a member of a class of hermits who spent their lives on pillars (Greek *styletes*). He was the founder of the order, and lived in the beginning of the 5th century. He was a Syrian monk and spent nine years in a monastery without stirring from his cell. Then, in his desire for holiness, he ascended a pillar near Antioch. where he spent 30 years. The pillar was 72 feet high and only four feet square on the top. His fame brought crowds of pilgrims, to whom he preached, making many converts from paganism. He died on his pillar in 459, when 72 years old, and was buried with great pomp at Antioch. Other monks followed his example down to the 12th century.

Styx (*stĭks*), in Greek mythology, is one of the rivers of the lower world, around which it flows seven times. Charon ferries the souls of the dead over this stream. It is named from the nymph Styx, the daughter of Oceanus, who first came to the help of Zeus against the Titans.

Sub'marine' Nav'iga'tion. See TORPEDO.

Subsoil is the soil below the surface-material which has undergone chemical change by weathering (see SOILS) and may contain humus, making it darker than the subsoil. Subsoiling is deep plowing to bring up the lower soil that has not been exhausted by cropping Its mineral food cannot become available until decomposed by weathering-agents (see NITROGEN-GATHERING CROPS). The weathering process goes on slowly, and land has been greatly injured by bringing up too much at once. Subsoiling should go on at the rate of about half an inch a year till a depth of nine or ten inches is reached.

Suchau (*sōō'chou'*), one of the largest cities in China, is 50 miles northwest of Shanghai, on the imperial canal. It is built on islands separated by canals. It is a center of silk-manufacture and printing. It was captured in the Tai-ping rebellion, and retaken by "Chinese" Gordon in 1863, when many of its finest buildings were destroyed. Population 500,000.

Suck′er (in plants), a very strong-growing branch which arises in an unusual position, as from the older parts of trees and shrubs, often at the base, or in connection with wounds. The process known as pollarding is for the purpose of inducing the development of suckers by means of wounds. Suckers are often called watersprouts.

Sucker, the name given a number of freshwater fishes of North America, with thick, fleshy lips bordering a sucking mouth. There are about 60 species in the family, which embraces the buffalo-fishes of the Mississippi Valley, the common suckers and the mullet or red horse They feed on plants and small water-animals. The common or white sucker reaches a length of 18 inches, and is very abundant in streams from Canada to Montana and Florida. They are eaten, but the flesh is rather tasteless and bony. The *remora* (*q. v.*), having a sucking-disk on the back of the head, is also sometimes called a sucker, and the name is also applied to the hag and certain other fishes.

Sucre (*sōō′krȧ*), a name for Chuquisaca, the capital of Bolivia (*q. v.*).

Sudan (*sōō-dän′*), a vast region in Africa, stretching from the Atlantic to the Red Sea and from Egypt and the Sahara almost to the equator. The Arabic name, *Beled-es-Sudan*, means Land of the Blacks. It is the home of the true negro race. Its area is estimated at 2,000,000 square miles, its population at 20,000,000. There are three divisions — eastern, western and central Sudan. Eastern Sudan is sometimes called the Egyptian Sudan, which until 1882 was a province, with Khartum for its capital. It is now divided into 13 provinces, which are subdivided into districts and include Bahr-el-Ghazal, Berber, Blue Nile, Khartum, Kordofan, Red Sea, Senaar, Upper Nile, White Nile and other provinces. (Darfur, though within Egyptian Sudan and paying tribute, has a hereditary sultan and manages its internal affairs almost independently.) The regions watered by the Nile are very fertile, yielding great crops of cotton, indigo, sugar, rice, corn and tobacco. Other parts are bare, though covered with grass in the rainy season, when they afford pasture to large flocks of camels, sheep and goats. Other products are ivory, ostrich-feathers, gums, india-rubber, iron, gold, honey and wax.

Egyptian Sudan covers 950,000 square miles, and has a population of about 2,000,000. The Egyptians for 60 years after 1819 extended their power over the regions around Khartum and even to the Wellé and to Lake Victoria, but in 1877 and 1882 the native tribes rebelled. General Gordon, sent out by the English government to the help of Egypt, was shut up in Khartum, and his mission ended in disaster. In 1896 the Anglo-Egyptian army again sought to recover the lost provinces, and after two years were successful. A convention between the British and Egyptian governments followed, in which it was agreed that they should govern Sudan jointly through a governor-general. Khartum is in railway and telegraphic communication with Cairo, and on Dec. 12, 1899, Sudan was declared open for general traffic. Western Sudan includes the valleys of the Niger, Senegal and other rivers draining into the Atlantic and the countries known as French Sudan. Central Sudan covers the valleys of the rivers that drain into Lake Tsad. Consult Schweinfurth's *Heart of Africa* and Nachtigal's *Sahara and Sudan*. See Africa, Egypt, French Sudan, Niger River, Nigeria, Nile, Senegal, Sokoto and Timbuktu.

Sue (*sü*), **Marie Joseph Eugene,** a French writer, was born at Paris, Dec. 10, 1804. He practiced surgery for some years in the army, in Spain and at Navarino, using his experience in his novels. *The Mysteries of Paris*, a famous novel, was his first success. It was printed in 1842, and appeared first in *The Journal of Debates*. *The Wandering Jew*, with which Sue's name is most associated, was also printed first in a newspaper, and issued afterward in ten volumes. He later wrote *Seven Capital Sins* and *Mysteries of the People*. The last work was condemned by the court at Paris as immoral and seditious. In 1850 he was elected a deputy to the assembly, but went into exile after the accession of Napoleon III and died in Savoy, Aug. 3, 1857.

Suez (*sōō-ez′*) **Canal,** a passage connecting the Mediterranean and Red Seas, was begun in April, 1859, under the French engineer, Lesseps (*q. v.*). Half the money for the great work was raised by subscription in Europe, and the other half by the khedive of Egypt. The canal was finished in 1869. It cost about $100,000,000, and is 87 miles long and originally from 150 to 300 feet wide at the top and 26 feet deep. In 1886 it was widened and deepened. The highest point cut through is not more than 50 feet above the ocean. Sidings, side-basins to allow vessels to pass each other, are built every five or six miles. Since 1887 the canal has been lighted by electric light. It costs a vessel about $500 to make the passage, and takes a little over 24 hours. Annually 4,000 vessels, exceeding 23 million gross tons, pass through the canal and the number of passengers, military and civilian, exceed 300,000. Population of Suez, Port Said and Canal Environs, 75,149.

Suf′frage is the right and act of voting either for the election of public officers or upon such laws as may be submitted to the people. As a result of a struggle of nearly half a century, the franchise was given to American women by an amendment to the constitution in 1920. After the Civil War and the adoption of the fourteenth and fifteenth amendments, it was determined to take similar action with regard to woman's suffrage, and shortly after the fifteenth amendment was submitted to the legislatures, the National Woman's Suffrage Association was formed, declaring its sole object to be a constitutional amendment to enfranchise women. After twenty years' struggle with congress, a resolution to submit the amendment to the states was passed on June 4, 1919. The amendment became a part of the constitution on its ratification by Tennessee, the Thirty-sixth state to take such action, on August 26th in the following year. Previous to the Civil War most of the states had adult manhood suffrage, negroes excluded. By the fifteenth amendment to the constitution the states are forbidden to abridge suffrage "on account of race, color or previous condition of servitude." Other conditions have been imposed, however, by some of the states by which negroes in those states are for the most part now disfranchised. In North Carolina and Louisiana all whose fathers and grandfathers enjoyed the suffrage in 1867 may enjoy it without regard to other qualifications. Some of the southern states have used educational tests after the fashion of Massachusetts and Connecticut, chiefly in order to disfranchise the ignorant element among the negroes.

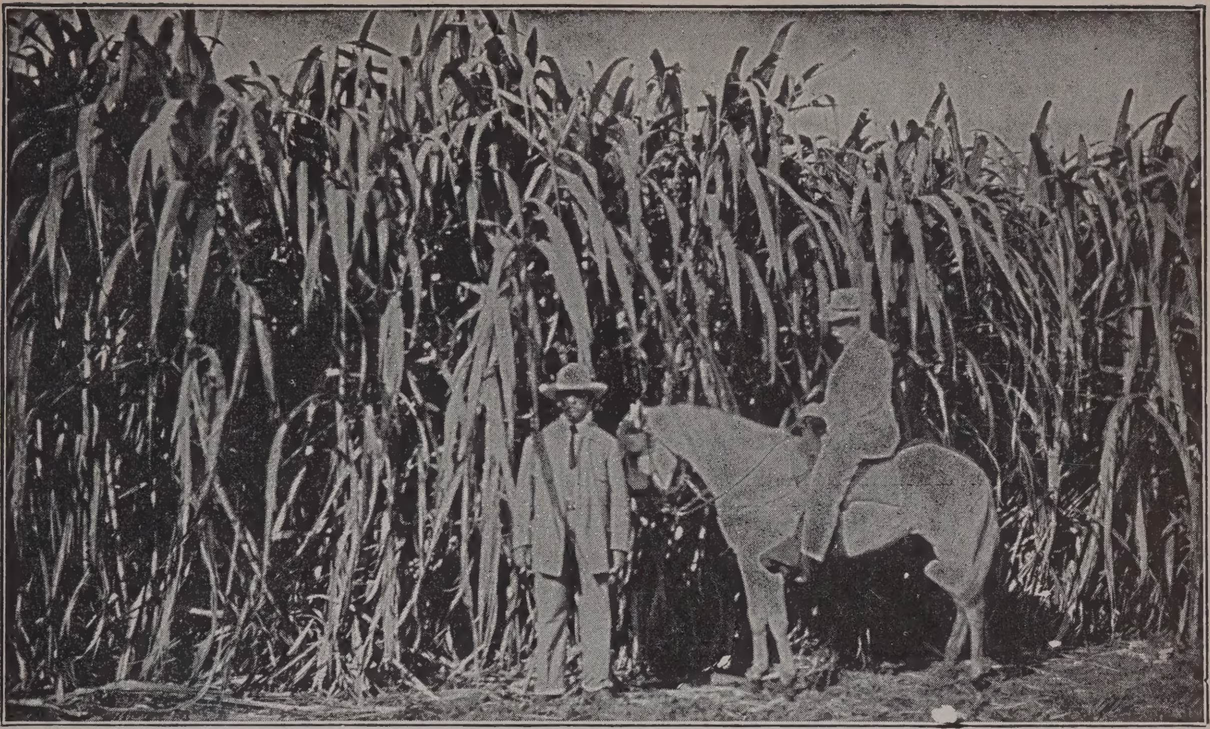
MEDITERRANEAN SEA
Damietta Mth.
Kawa Burun
Damietta
Debeh
Port Said
Lake Menzaleh
Riv. Nile
Pelusium Bay
Menzaleh
Ft. Tineh
L. Sirbonis
Mansurah
San
El Kantara
Salihieh
Ballah Lakes
Abu Kebir
El Ferdane
Ramses
Ismailia
El Gisr
Zagazig
L. Timsah
Tusun
Fresh Water Canal
Tel-el Kebir
Serapeum
Belbeis
El Ambek
Great Bitter Lake
J. Dimesh
Lit. Bitter L.
Jebel Ahmed Taher
Shaluf et Terraba
J. Uwebid
CAIRO
Suez
Gharbun
Port Ibrahim
J. Attaka
Ain Musa
SUEZ CANAL.
ENGLISH MILES
10 0 10 20 30 40
Gulf of Suez

The Isthmus of Suez and the Canal.

Suffren′, Pierre Andre de, a French naval hero, was born at Saint-Cannat, July 17, 1726. He entered the navy when only 14, was captured but soon released, and served six years with the Knights of Malta. He was with the fleet blockading Gibraltar, and in command of five ships sailed to Madras, where he was in two or three battles, and conquered Trincomalee (1782). He was made vice-admiral of France on his return to Paris, where he was received with the greatest honors. He is called "one of the most dangerous enemies the English fleet has ever known, and, without exception, the most illustrious officer that has ever held command in the French navy." He died at Paris, Dec. 8, 1788. See *Studies in Naval History* by Laughton.

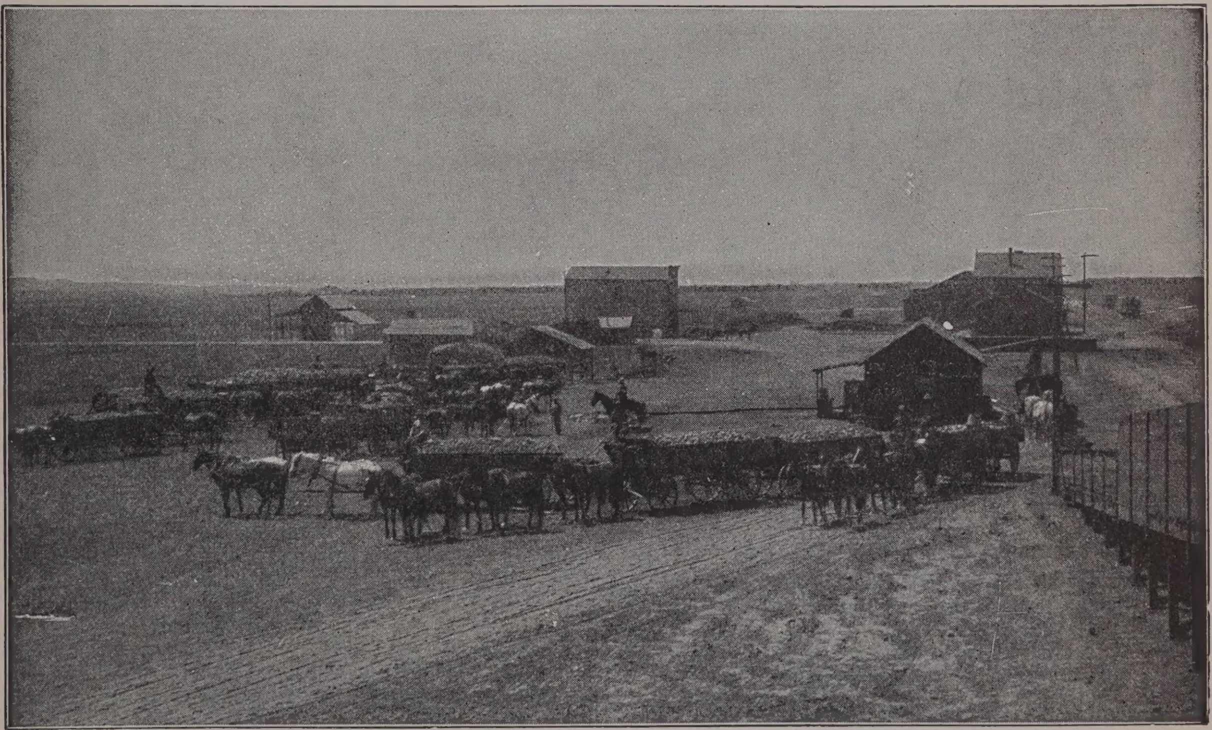
Sugar, the name of a great number of substances which have a certain chemical composition and are soluble in water. The sugar of commerce, however, is chiefly derived from sugar-cane and sugar-beet, the latter supplying nearly two thirds of the sugar used by the world. In these and other plants the sugar is an essential food, and is manufactured out of raw materials by green plants.

The sugar-cane (*Saccharum officinarium*) is thought to have originated in India, but it is not known wild. In the United States sugar-cane is most extensively cultivated in Louisiana, but it also is an important industry in Florida and Texas, and is cultivated to some extent in Mississippi, Alabama and Georgia. Cuba and Hawaii also are great centers of the sugar-cane industry. Sugar is extracted from cane by milling or by diffusion. The first method is more used, diffusion being confined almost wholly to sugar from beets. Mills handle from 200 to 1,400 tons of cane a day, and extract 90 to 95 per cent. of its sugar. The cane, cut or shredded before reaching the mill, is crushed, watered and crushed again. Watering the cane increased the quantity of sugar extracted by the second crushing, the increase being four or six pounds of sugar for each ton of cane. The sugar-juice extracted is next clarified and impurities removed. This is done by defecation, carbonation or superheating. Each process uses chemicals, as lime, sulphur or others; heat; settling; and filtering. Defecation consists in straining the juice through copper-wire gauze, drawing it into a tank, and, in case sulphur is used, mixing it thoroughly with sulphur dioxide. From the tank the juice is drawn into clarifiers of 2,000 to 6,000 gallons, where it is neutralized by milk of lime and heated almost to boiling. Some impurities rise, and others sink, but both are removed and the clear juice is drawn off and filtered. The liquid is then concentrated to such a density that the sugar crystallizes. This is accomplished in up-to-date factories by vacuum-appa-



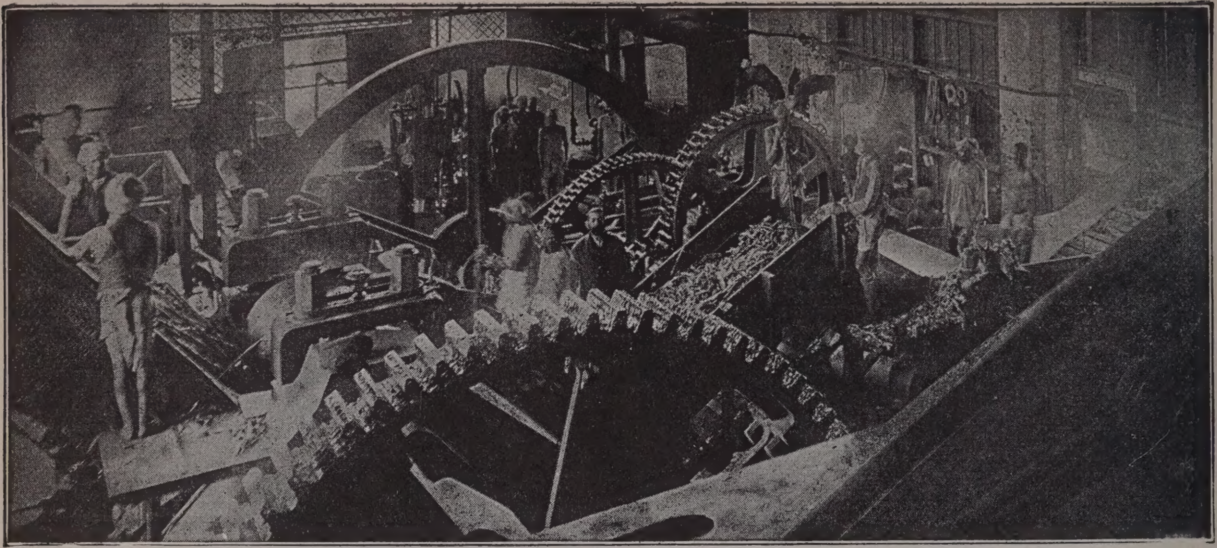
From Brown Bros.

The sugar of the world is made chiefly from sugar cane and from sugar beets. This picture of a sugar cane field, with the figure of a man standing and of another on horseback, shows the height to which the cane grows, which is frequently more than twelve feet. In grows in tropical and semi-tropical countries and is grown from cuttings, as the plant rarely bears seed.



From Brown Bros.

About half of the world's sugar is now produced from sugar beets, and this industry has become a highly important one in the northern section of the United States, in Germany and other countries. We here see wagon loads of sugar beets being hauled to the railroad station for shipment to the sugar factory.



From Brown Bros.

Sugar cane is cut and shipped to a sugar mill. Here the cane is crushed by machinery, which we see in this picture, and is then placed between rollers which squeeze out the juice The juice is first treated with milk of lime, to remove impurities which settle to the bottom of the tank, and the juice is then heated and evaporated, and raw or unrefined sugar is produced.

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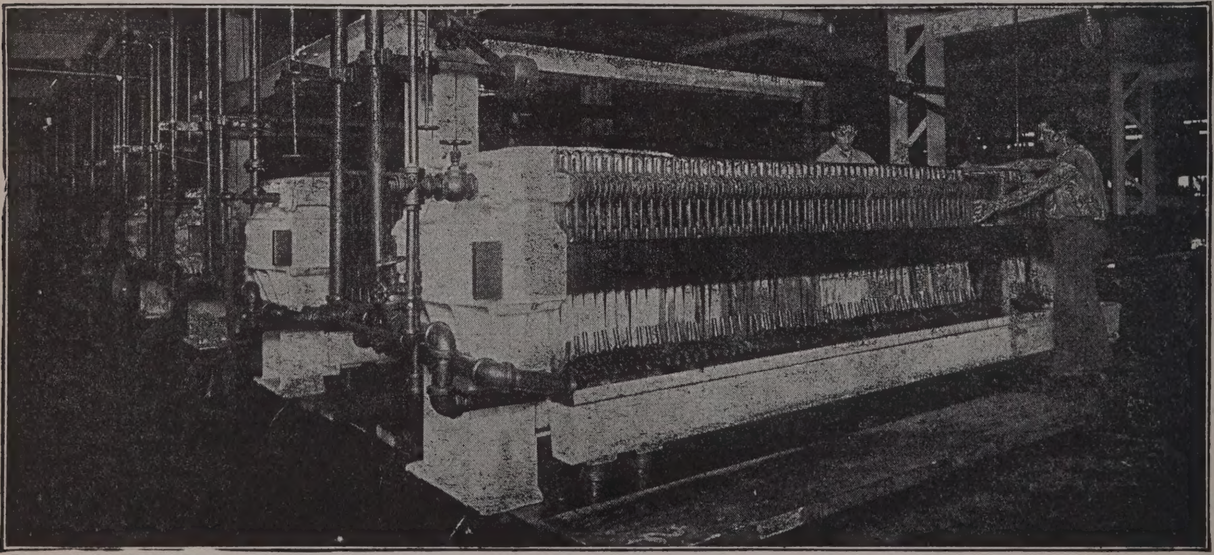
Raw sugar is here dumped through the grating into an elevator which carries it to the top of the building, where the work of refining sugar begins.



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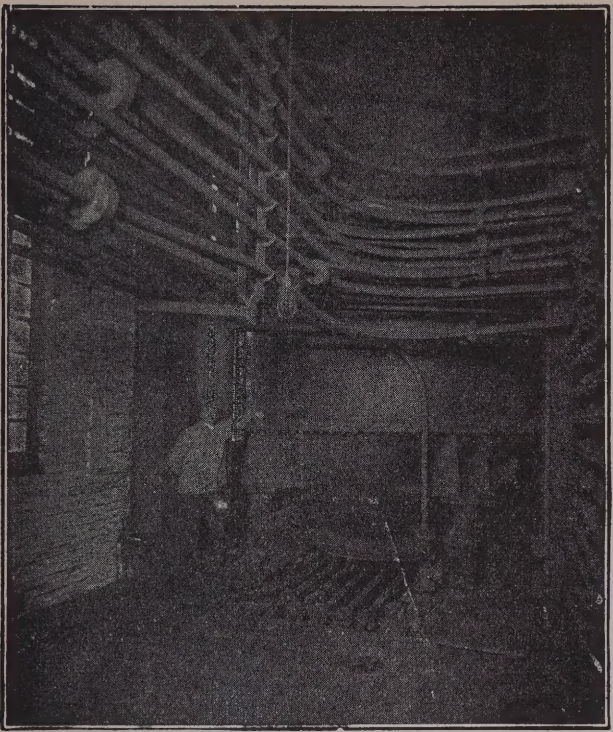
Here the raw sugar is first mixed with water and is then melted and passes through the filter presses which we see in this picture. Here the sugar liquor is filtered to remove particles of dirt or other matter.



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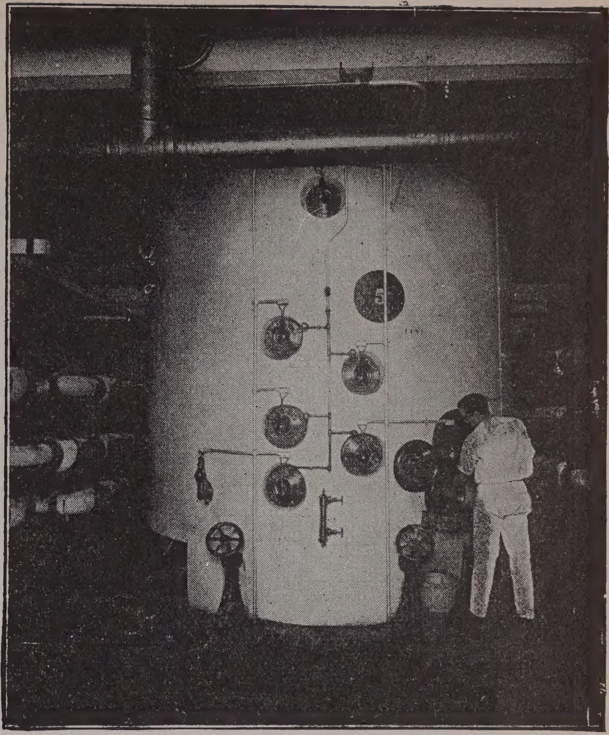
The sugar in liquid form is then passed through the filter of bone charcoal which we see in this picture. This removes all the coloring matter from the liquid, leaving it white and ready for producing white sugar.



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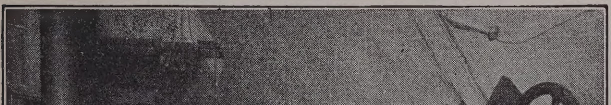
The syrup now passes into a machine called a vacuum pan which we see in this picture. Here it is boiled to remove the water, and this boiling must be very carefully done, to secure proper granulation and appearance of the finished product.



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When the syrup has been reduced to the point of granulation and is a half solid mass, it passes from the vacuum pan to the centrifugal machine which we see in this picture. Here by centrifugal or whirling action the sugar is separated from the syrup, with which it is mixed and becomes granulated sugar

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The sugar, which is still damp but otherwise finished, then passes to granulators or dryers which we see here. It is here kept constantly in motion in steam-heated drums, to remove all trace of moisture and, at the same time, keep it in a granular condition, free from lumps.

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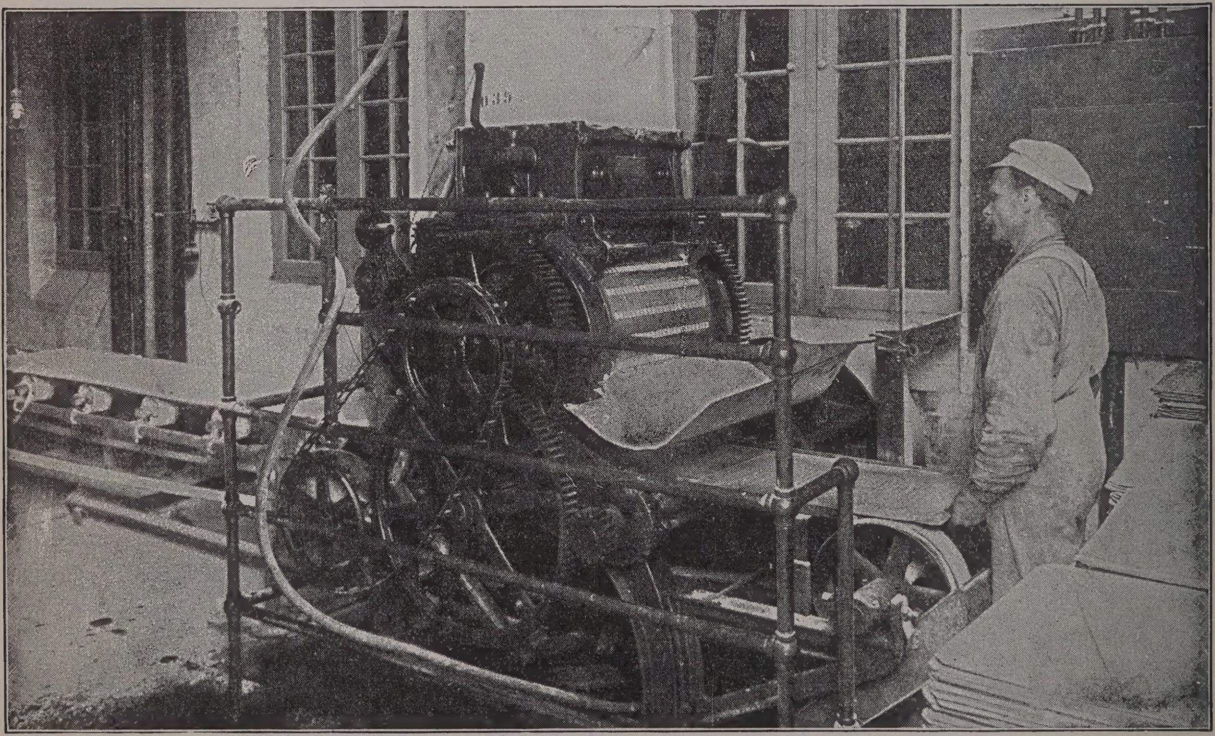
In this picture the finished granulated sugar is conveyed through tubes to the packing room and is packed in barrels, ready for shipment.



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This is a cube machine. Damp granulated sugar is here forced by pressure into small moulds on the outside of a cylinder. The cubes are later more thoroughly dried by steam in a drying room or oven, and then are packed for the market.

ratus, — a dome-shaped receptacle of five to ten feet diameter, eight to 15 feet height and provided with steam-coils. The juice passes through three of these pans, is concentrated by steam and boiled. When grains of sugar are found, crystallization has occurred, and the rest of the process consists in making these become whatever size is wanted. This object is gained by continuing the boiling *and inserting little amounts of syrup time and again.* Finally the mixed syrup and sugar are separated in a centrifugal machine revolving 1,000 or 1,200 times a minute, which throws the molasses out, whereas the sugar stays. This sugar is "first" or "raw" sugar.

Annually the production of cane-sugar averages 8,000,000 (long) tons, the United States (including Hawaii, Porto Rico and the Philippines) producing 1,200,000 tons, Cuba 1,900,000 and Java 1,100,000 Mauritius, Brazil, Queensland, Peru, the British West Indies, Argentina, Demerara and Haiti and Santo Domingo also produce cane-sugar, Mauritius yielding 220,000 tons, but Haiti and Santo Domingo only 60,000. Consumption of cane-sugar in the United States annually is over 2,500,000 tons.

The sugar-beet (*Beta vulgaris*) came, from Burgundy, and is extensively cultivated in Europe. In the United States the sugar-beet industry is comparatively recent, and is mostly largely developed in Colorado. Cultivating this beet is extremely expensive. Harvesting begins at different times in different sections, — in California as early as August, elsewhere as late as October, — and takes two or four months. The beets are washed and sliced, and then their sugar is extracted by washing them in cells filled with hot water. The liquid sugar-solution is purified by carbonation, that is, by applying lime and carbon dioxide, bleached with sulphur dioxide, and then settled and filtered. The filtered liquid is treated like cane-sugar. Germany before the war, ranked high in beet-sugar making. In 1911 it produced 2,572,000 (long) tons; Russia 2,075,000; Austria 1,600,000; France 756,000; the United States only 510,000; Belgium 283,000; and Holland 181,000. Colorado produced 199,405 tons, California 127,272 and Michigan 106,053. The whole world's production of beet-sugar was 8,575,704 tons.

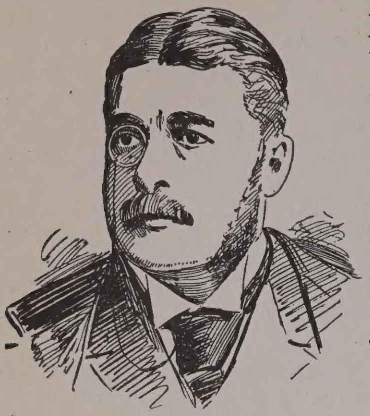
The sugar-trade of the world is regulated by international agreement (1902). The United States, which, with Cuba, can easily supply the American demand, have practically ceased to import sugar from Europe.

Maple-sugar is a sugar of minor commercial importance, the maple chiefly used being *A. saccharinum.* The principal centers of this industry are Vermont, New York and Ohio.

Su'liotes, a mixed race who inhabited the valley of the ancient Acheron in what now is European Turkey. They were of Greek and Albanian origin, and were descended from a number of families who fled from Turkish oppression to the mountains of Suli, whence their name. For several years they resisted the Turks, but, vanquished at last, took refuge in the Ionian islands. Though they helped in the war of Greek independence under their brave leader, Marco Bozzaris, their country was not included within Greek boundaries by the treaty of 1829 nor by the extension to that treaty of 1881, but most of them established themselves in that country. See *History of Suli and Parga,* by Perhaebos.

Sul'la, Lucius Cornelius, a Roman dictator, was born in 138 B. C. As quæstor in 107 under Marius in Africa, he induced the Mauritanian king to surrender Jugurtha, whom he brought in chains to the Roman camp. He was in the war against the Cimbri and in Cilicia, where he was sent by the senate to restore the king to his throne. On his return to Italy in 91 the rivalry between him and Marius threatened to break out openly, but was checked for a time by the Social War, in which Sulla won a brilliant success. He was given command in the second war against Mithradates, but Marius affected his expulsion from Rome, only to be in his turn driven out by Sulla. The four years he spent in the east were years of great success, in which he took Athens and won the victory of Chæronea. He crossed the Hellespont, forced Mithradates to ask for peace, landed at Brundusium and before the gates of Rome fought the great battle with the Samnites in which 50,000 men fell on each side. Sulla was now master of Rome and Italy. His dictatorship was marked by the cruel murder of his enemies. He published a list of proscribed persons whom any one might kill, and in this way got rid of his enemies, to the number of nearly three thousand. He made some changes in the government, mainly in strengthening the senate and taking the power from the people. He spent his last years at Puteoli in dissipation, bearing the marks of it in his blotched face, compared by the Greeks to a mulberry sprinkled with meal. He died in 78 B. C. The inscription on his monument, said to have been composed by himself, asserts that none of his friends ever did him a kindness, or none of his foes a wrong, without being well-repaid.

Sul'livan, Sir Arthur Seymour, an English composer, was born at London, May 13, 1842. He studied at Leipsic. He wrote *Kenilworth,* a cantata; the overtures *In Memoriam* and *Marmion* and the oratorios of *The Prodigal Son, Light of the World, Martyr of Antioch* and *The Golden Legend.* He is best known by his hymn-tunes (by *The Lost Chord* especially) and by his songs and burlesque operas. The operas were written in connection with W. S. Gilbert and were very popular, especially *H. M. S. Pinafore*, which ran for 700 nights, and *The Mikado*. Later he wrote the opera of *Ivanhoe*. He received many honors, and in 1883 was knighted. He died on Nov. 22, 1900.

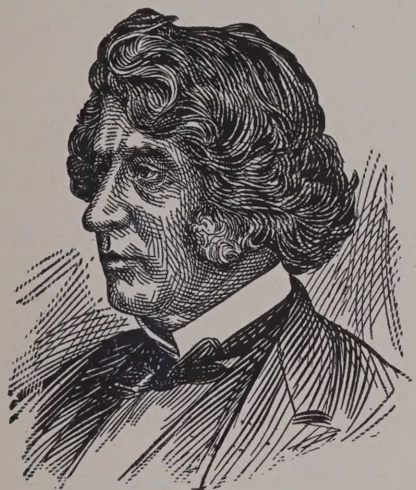

SIR ARTHUR SULLIVAN

Sulphur (*sŭl′-fŭr*), one of the nonmetallic elements. It is found very widely distributed in the mineral knigdom, partly free, partly in combination with other elements. It is usually abundant in volcanic districts, large quantities coming from Sicily. It is found in many parts of the United States, but this cannot compete with that from Sicily. Free sulphur is found mixed with earthy matter or pure in the shape of crystals. In combination it is found with iron and copper as iron and copper pyrites; with lead in galena; with zinc in blende. It is also found in the form of sulphates, as the sulphates of lime and magnesia. In vegetables it exists in the proteids or albuminoids of seeds, in the oils of mustard, garlic and asafœtida and in the juices of some plants. In animals it is found in the tissues, hair, saliva etc. Sulphur is a solid, brittle, yellow substance, without taste or smell, and will not dissolve in water. When heated, it forms a thin yellow liquid; heated to boiling-point, it forms a yellow vapor. This vapor condenses into a fine powder, called flowers of sulphur. When it is melted, it is poured into molds, which make the common roll-sulphur or brimstone. When heated in the air it takes fire, burning with a blue flame, and changes into sulphurous acid with suffocating fumes. Sulphur is used in making matches and gunpowder and, as sulphurous acid, in bleaching, in the destruction of insects and the germs of disease and in the manufacture of sulphuric acid or oil of vitriol, which is a compound of sulphur, oxygen and hydrogen. Large quantities of the acid are used in preparing sodium sulphate from common salt as a preliminary step in one of the processes for making soda.

Sulu (*sōō-lōō′*) **Islands, Philippine Group,** acquired by the United States from Spain by the terms of treaty of peace, Dec. 10, 1898. The Sulu archipelago extends from the southwestern peninsula of Mindanao Island to the northeastern angle of Borneo and between the Sulu and Celebes Seas, the latter an eastern inlet of the Pacific. The larger islands are mountainous and of volcanic origin; the smaller ones are chiefly coral islets, covered with verdure. There are five chief islands, the dominant race being the Moros, speaking the Sulu tongue, which is akin to that of the Malays. The inhabitants are hardly civilized yet, and consequently piracy was common among them even under Spanish rule. The staple growths include corn, rice, coffee, chocolate, sesame, saffron, cotton and hemp. The Chinese formerly did considerable barter with the islands, exchanging opium, tobacco and general merchandise for pearl-shell, coral, sharks' fins and native cordage. Estimated population 51,400, of whom less than 1,300 were civilized in 1903.

Su′mac, species of the genus *Rhus*, which contains over 100 species, chiefly tropical. In the United States there are about ten species, some of them well-known shrubs or small trees, with leaves which show bright red to purple coloration in autumn. The common poison-oak or poison-ivy (*R. Toxicodendron*) is a sumac whose foliage is very poisonous. The most common form is *R. glabra* or smooth sumac, a shrub which often covers large and especially barren areas, with large compound leaves and dense, crimson, velvety clusters of fruit. See POISONOUS PLANTS.

Suma′tra (*sŏŏ-mä′trä*), one of the largest islands of the Indian Archipelago, lies on the equator. It is 1,115 miles long and 275 broad, and is a dependency of the Netherlands. The Chain Mountains in several ranges, from 7,000 to 10,000 feet high, cross the island, with seven or eight active volcanoes and a number of mountain lakes. There are large rivers on the western side of the island, and the forests are so thick that it is said an ape can travel across the island from tree to tree without once descending to the ground. A Dutch expedition in 1877, exploring only a small part of the western side, collected 400 varieties of timber. The animals of the eastern side differ entirely from those on the western side. The orang-outang (*q. v.*) and the bru are the most common apes. The bru is employed by the natives to gather their cocoanuts. The tiger, Malay bear, hog, two-horned Sumatran rhinoceros and elephant are among the best-known animals. The python, 15 to 20 feet long, cobra and crocodile are found; and 250 species of spiders have been discovered since 1858. Gold and coal are mined; rice, sugar, coffee, pepper, cocoanut, sago, corn and sweet potatoes are cultivated. The people are of different tribes of the Malay family. The island became known in 1508 to Europeans through a Portuguese explorer, and Portuguese trading-stations were formed on the coasts. The Dutch drove out the Portuguese, but did not completely occupy the coast until 1881, and large parts of the interior are still unexplored. The area is 161,612 square miles, with a population of 4,029,000. In 1832 what is known as the culture-system originated in Java and spread to the western coast of Sumatra. This meant the officially superintended work of the natives in the culture of various products; but in 1870 this system was abolished, and native labor is now required only for the production of coffee. The Europeans and those connected with them live under the laws of the mother-country, while there are separate laws for the natives. Schools are provided for Europeans, natives and orientals. Consult Alfred Russell Wallace's *Indian Archipelago.*


CHARLES SUMNER

Sum'ner, Charles, an American statesman, was born at Boston, Mass., Jan. 6, 1811. He studied at Harvard and adopted the profession of law. He edited *The American Jurist* and three volumes of law-decisions, chiefly those of Judge Story, and lectured in the law-school at Harvard. He carried his law-studies farther in Europe at the Sorbonne, and spent two or three years in travel, receiving marked attention when in England. His appearance in politics dates from July 4, 1845, when he delivered his oration on *The True Grandeur of Nations*, which denounced the use of war to decide national questions and attracted general attention both in America and Europe. He succeeded Daniel Webster in the senate of the United States in 1850, and retained his position through successive re-elections until his death. He helped to form the Free Soil party, and stood almost alone in the senate at that time in his opposition to slavery. His strong, uncompromising attacks upon slavery were bitterly resented by the south. This hostile feeling resulted in an attack upon Sumner while sitting at his desk in the senate-chamber, from the effects of which he suffered for nearly four years. His speech on *The Barbarism of Slavery*, delivered in June, 1860, was occasioned by the struggle over the admission of Kansas as a free state. As chairman of the committee on foreign relations, in March, 1861, he argued against the seizure of the Confederate commissioners in the Trent affair, and made a powerful speech on *Our Foreign Relations* and one on *Our Claims against England.* He was selected in April, 1865, to deliver the eulogy on Lincoln. His opposition to the treaty with Santo Domingo in 1869, brought him into difficulty with President Grant, and ended in his supporting Greeley for the presidency in 1872. Among his last important measures were the introducing of the civil-rights bill and of the resolution to remove the names of battles of the Civil War from the colors of the army. His publications are made up of his public addresses, and fill 15 volumes, prepared for the press partly by himself and partly by Longfellow, his literary executor. Consult *Memoirs and Letters* by Pierce and *Life* by Lester. He died at Washington, D. C., March 11, 1874.

Sumner, Edward Vose (1797–1863), American soldier, was born in Boston, Mass., and educated at Milton Academy. In 1819 he entered the army as second lieutenant, and served in the Black Hawk and Mexican Wars and took part on the frontier in campaigns against the Indians. In the early 50's he was governor of New Mexico, and later saw further Indian fighting, chiefly against the Cheyennes. In the Civil War he was given charge of the Department of the Pacific, with the rank of brigadier-general, but was subsequently transferred to the Army of the Potomac, where he served during the Peninsula and Antietam campaigns and saw severe fighting at Fair Oaks and Fredericksburg. For these services he was promoted to be major-general both in the volunteer and the regular army. Late in 1862 he was assigned to command in the Department of Missouri, but died (at Syracuse, N. Y.) ere he could reach the field of his new duties.

Sum'ter, Thomas (1734–1832), an American Revolutionary soldier, was born in Virginia. Early in his career he served under Braddock in the disastrous expedition against Fort Duquesne and took part in fighting the Cherokees. In 1776 he was appointed lieutenant-colonel of a regiment of South Carolina riflemen, and subsequently became a partisan commander, defeating the Tories in 1780 at Hanging Rock. Twice he had to accept defeat at the hands of Tarleton, the English general in command of *The British Legion*, though later he settled accounts with that general at Blackstock Hill, though himself wounded in the affair. Prior to this. and while in command of the South Carolina troops, he had gained the rank of brigadier-general. At the close of the Revolutionary War he acted as a member of the South Carolina convention which ratified the Federal constitution, and for two periods (1789–93 and 1797–1801) was a member of the Federal house of representatives. During 1801–09 he served in the national senate, and during 1809–11 he was minister to Brazil. When he died, he was the last general officer of the Revolutionary era.

Sun, The, our nearest star and the central body of the solar system. For the inhabitants of the earth no other body in the heavens compares for an instant with the sun in interest and vital importance. For not only are the orbits of the earth and the other planets determined by the sun, but all forms of life on the earth immediately depend upon heat and light from the sun.

The distance of the sun from the earth is 92,897,000 miles, a stretch which baffles the imagination. Professor Young illustrates this quantity by saying that if a child were provided with an arm long enough to reach the sun and thus burn his hand, he would die of old age before he learned that he was burnt, assuming, as Helmholtz found, that sensations travel along the nerves at the rate of about 40 feet per second. Even light itself, traveling with the stupendous speed of 186,000 miles per second, requires 499 seconds for the trip from the sun to the earth.

The diameter of the sun is approximately 866,500 miles, a distance nearly twice as great as the diameter of the moon's orbit, while the mass is 1,332,000 times that of the earth, making its density about 1½ times that of water and the attraction of gravitation at the surface of the sun 27 times as great as at the surface of the earth. The weight of an ordinary man at the solar surface would, therefore, be such that he could not stand erect with his present strength of muscles.

The period of rotation of the sun was first determined after Galileo had discovered spots on the solar surface; and this rotation takes place in a very remarkable manner, for Carrington found that at the sun's equator spots travel once around the sun in 25 days, while at latitude 30° the period is 26½ days, and at latitude 40° is no less than 27 days. Hence the sun rotates most rapidly near the equator and diminishes constantly in angular speed as one approaches the poles. This fact has never been satisfactorily explained.

As to the constitution of the sun and as to the nature of sun-spots there are almost as many "theories" as there are men. What is reasonably certain, however, is that practically all of the elements which have been found in the earth's crust are to be found in the sun, making it highly probable that at some time the earth split off from the sun in the manner suggested by the nebular hypothesis. Concerning the interior of the sun practically nothing is known; for its temperature is outside the range of our experiments.

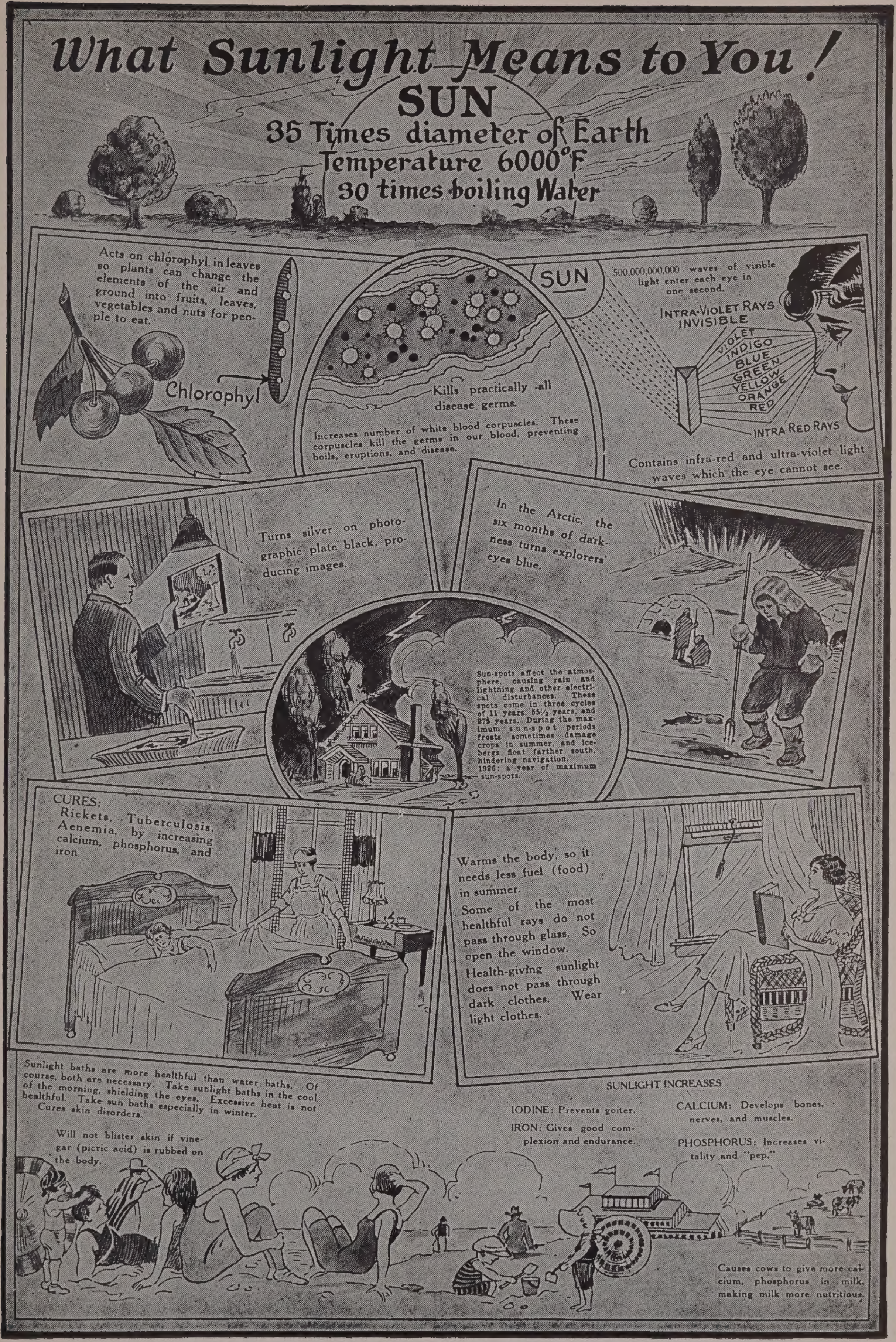
The white surface of the central body of the sun is called the *photosphere.* The spectroscope shows that this photosphere is surrounded by a layer of incandescent gases which we call the *chromosphere.* Certain parts of this chromosphere appear at times to be heaped up into brilliant clouds thousands and even hundreds of thousands of miles high; these are called *prominences.* Beyond the prominences and the chromosphere is a halo of light seen only at times of eclipse. It is called the *corona;* but beyond the mere fact that it is an appendage of the sun little is known about it. The fact, however, that its spectrum contains bright lines would seem to indicate that it consists partly, at least, of a self-luminous gas.

The best account of solar phenomena is to be found in Professor Young's delightful volume, *The Sun,* published in the International Scientific Series. See ASTRONOMY and PLANETS.

Sun'bury, Penn., a borough, county-seat of Northumberland County, on Susquehanna River about 55 miles from Harrisburg. It is in a coal and lumbering region, and makes extensive coal-shipments. Its important manufacturing establishments are sash, door and nail factories, coffin and casket works, a rolling and a planing mill, silk-mills, dye-works and railroad-shops. Among its noteworthy buildings are Mary M. Packer Hospital, the county courthouse and municipal buildings. East Sunbury is just across a small stream. Though the towns have separate municipal governments, they are united in their industrial interests. Sunbury was settled in 1772 and incorporated in 1797. It has the service of the Pennsylvania and Reading railways. Population 13,770.

Sun'day-Schools are schools for religious instruction, meeting on Sunday. There were schools for religious instruction in connection with the Jewish synagogues and also among the early Christians. Luther established such schools in Germany, and Knox in Scotland. But the credit of founding the modern system of Sunday-schools belongs to Robert Raikes, who in 1780, when living in Gloucester, England, gathered the children from the streets on Sunday and hired teachers for them at 25 cents a day. These schools opened at 8 A. M., lasted until the children went to church, and after the second service began again, holding until 5:30 P. M. The children were taught their letters, reading and the church-catechism. The first Sunday-school in

What Sunlight Means to You!



SUN
35 Times diameter of Earth
Temperature 6000°F
30 times boiling Water

Acts on chlorophyl in leaves so plants can change the elements of the air and ground into fruits, leaves, vegetables and nuts for people to eat.

Kills practically all disease germs.

Increases number of white blood corpuscles. These corpuscles kill the germs in our blood, preventing boils, eruptions, and disease.

500,000,000,000 waves of visible light enter each eye in one second.

Contains infra-red and ultra-violet light waves which the eye cannot see.

Turns silver on photographic plate black, producing images.

In the Arctic, the six months of darkness turns explorers' eyes blue.

Sun-spots affect the atmosphere, causing rain and lightning and other electrical disturbances. These spots come in three cycles of 11 years, 55½ years, and 275 years. During the maximum sun-spot periods frosts sometimes damage crops in summer, and icebergs float farther south, hindering navigation.
1926: a year of maximum sun-spots.

CURES:
Rickets, Tuberculosis, Aenemia, by increasing calcium, phosphorus, and iron

Warms the body, so it needs less fuel (food) in summer.
Some of the most healthful rays do not pass through glass. So open the window.
Health-giving sunlight does not pass through dark clothes. Wear light clothes.

Sunlight baths are more healthful than water baths. Of course, both are necessary. Take sunlight baths in the cool of the morning, shielding the eyes. Excessive heat is not healthful. Take sun baths especially in winter.
Cures skin disorders.

Will not blister skin if vinegar (picric acid) is rubbed on the body.

SUNLIGHT INCREASES

IODINE: Prevents goiter.

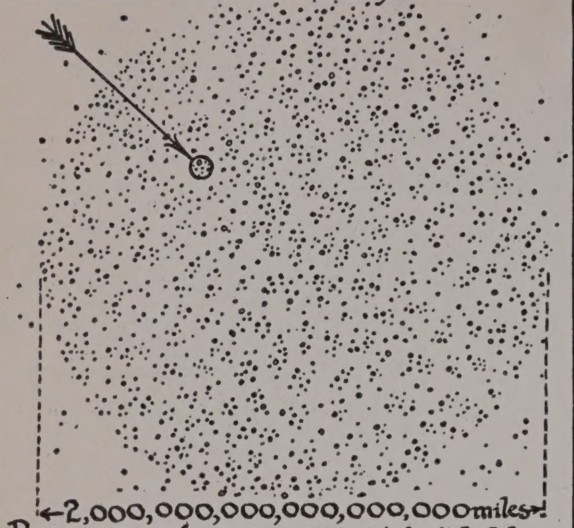
IRON: Gives good complexion and endurance.

CALCIUM: Develops bones, nerves, and muscles.

PHOSPHORUS: Increases vitality and "pep."

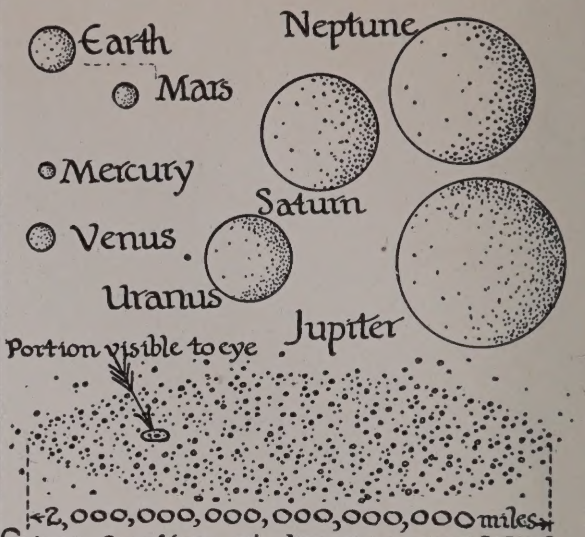
Causes cows to give more calcium, phosphorus in milk, making milk more nutritious.

Small circle contains: Sun, Earth, all other planets of the solar system and stars visible to the naked eye.—


←2,000,000,000,000,000,000 miles→

Breadth of known universe as revealed by telescope and camera.—

Some of the planets within the small circle to the left:—


Earth
Mars
Mercury
Venus
Uranus
Saturn
Neptune
Jupiter
Portion visible to eye
←2,000,000,000,000,000,000 miles→

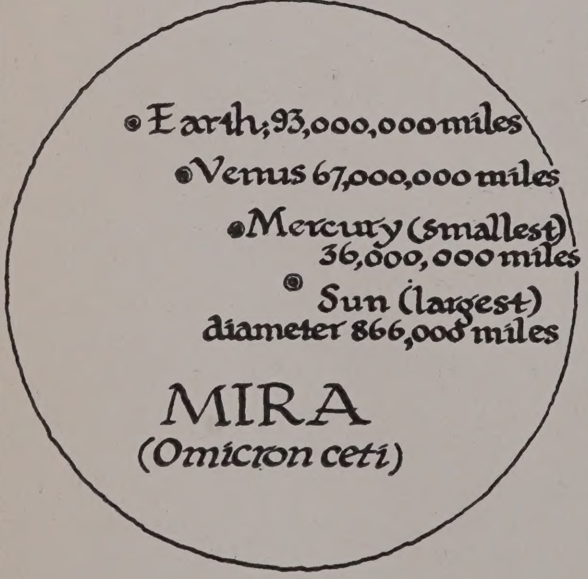
Cross section of known universe as revealed by telescope and camera.—

Size of the Known Universe

When an astronomer trains his telescope upon the remotest known stars, he receives light beams that began their journey from 200,000 to 300,000 years ago. Now light travels six trillion miles a year. So some of the stars are three hundred thousand multiplied by six trillion or 1,800,000,000,000,000,000 miles away from the earth. The sun is 93,000,000 miles away, and light reaches us from the sun in eight minutes.

If you were on some of the distant stars, and could see the earth plainly, what you would see to-day had happened on earth before the beginning of civilization, because it would take so many thousands of years for the light to reach you. If you were on some of the nearer stars, you might to-day see Caesar in Rome or Gaul; and if you were on a comparatively near star you might see the Civil War battles.

In the picture above the very small circle at which the arrow points represents all the universe you can see from the earth with the naked eye. Then look at the many other dots, and see how much larger is the known universe. As we invent higher powered instruments, the known universe becomes larger and larger.


Earth, 93,000,000 miles
Venus 67,000,000 miles
Mercury (smallest) 36,000,000 miles
Sun (largest) diameter 866,000 miles
MIRA
(Omicron ceti)

How Mira would encompass the Sun, Mercury, Venus, and Earth, if its center were in the position of the Sun.

Metamorphosis of a Star

The picture of the left represents Mira, or Omicron Ceti, one of the largest stars, and a young one. It is about 150 light years (one light year is six trillion miles) distant from the earth. The radius is 125,000,000 miles. The star is 27,000,000 times larger in bulk than the sun, and sends out about 1,000 times more heat. It is not solid, but gaseous. Its density is only 1/4,000 that of ordinary air. If the sun were in the center of it, the earth could revolve around the sun and still be inside the limits of Mira. As Mira grows older it will contract, gradually becoming a solid. Mira is younger than the sun, whose birthday has been estimated about 7,000,000,000 years ago.

London was started by Rowland Hill in 1784. There are now, it is estimated, 7,000,000 scholars in the Sunday-schools of Great Britain. The first regular Sunday-school in America is thought to be the one started by Bishop Asbury in Hanover, Va., in 1786, though there had been schools for instruction on Sunday at Roxbury and Plymouth, Mass., as early as 1674 and 1680.

In 1890 the number of teachers engaged in Sunday-school work was estimated to be nearly 2,000,000, with almost 18,000,000 pupils, including all denominations.

The instruction is usually given by voluntary and unpaid teachers, a plan first adopted by the Methodists in England. The classes usually meet in the auditorium of the church represented and in any other available space in the church-building. It has been the custom for many years, also, to use a uniform series of Bible-lessons.

Quite recently the need for radical reform in the conduct of Sunday-schools has become apparent to many. These schools, as a class, in the quality of their discipline, instruction and equipment are recognized as far inferior to the day-school. Yet religious instruction should be as well-given as arithmetic or geography, any one will admit. To bring about improvement the first requisite is a well-ventilated, properly heated and lighted room for each class, as in any good school. To this end individual churches are beginning to erect separate Sunday-school buildings, with one assembly-room and many recitation-rooms.

Next, only trained teachers are desired, who have had time, energy and interest enough to prepare themselves carefully for each Sunday's instruction. To secure these, some churches are now paying these teachers a certain sum, as in the day-school. It is a great advantage for the superintendent of a Sunday-school to bear such a business relation to his teachers. He then has some means of influencing them to improve their work, when necessary, and to attend regularly Beyond question very many persons have been giving instruction in religion who would not be considered for a moment as fit to teach any class in our public schools. Such a condition is bound to inculcate disrespect, on the part of many, for religion in general. Deep religious interest is essential to any Sunday-school teacher's success. But in addition to such interest there should be knowledge of the Bible and knowledge of good methods of instruction.

Sun'derland, a seaport of Durham, England, is at the mouth of Wear River, 13 miles northeast of the city of Durham. Among the public buildings are the town-hall, free library, museum, art-gallery, winter-garden and Victoria Hall, the scene of a terrible accident in 1883, in which 182 children were killed. Sunderland is known from documents to have been a town as early as 1311. It was a small place till the beginning of the 19th century, but since then, owing to the improvement of its harbor and the growth of Durham's coal-trade, it has grown fast. Population, 160,000.

Sun'fish, a common name used to designate a number of different fishes. The fresh-water sunfishes, of which there are about 25 species, abound in the Mississippi valley. They are bass-like fishes. The most common one is generally known as the pumpkin-seed. It reaches a length of eight inches and is of bright colors—greenish olive, with bluish sides spotted with orange, and the belly and lower fins orange-tinted. It is very abundant in ponds, lakes and streams of the east. In western rivers sunfishes rarely come south of the latitude of Chicago. The marine sunfish or head-fish belongs to an entirely different family. There are three species inhabiting the open sea. They are large fishes, with a very short body, and look like huge fish-heads provided with fins. They reach a weight of seven or eight hundred pounds and a length of seven or eight feet. They are not good for food, but a healing oil is derived from their livers. Their habit of basking in the sun at the surface of the water gives them their name, while that of fresh-water sunfishes is derived from their bright colors.

Sun'flower, species of *Helianthus*, a genus of the great composite family. There are many species native to the United States, but the best-known form is *H. annuus*, a common species in cultivation, distinguished by its great stature and very large heads. It is a native of the western plains. The seeds yield a drying-oil nearly equal to that of linseed.

Sun Yat-sen (1867–1925), Chinese statesman who studied to become a physician and surgeon, but who grew interested in government, and became at times military leader, an exile, and finally president of South China (Canton Province). He was born in Kuantung province; his father was a Christian Chinese. As a youth, he studied in the schools of Hawaii, and later was graduated from a medical school at Hong-Kong. Then the science of government began to dominate his thoughts, and he read many books of a socialistic nature. He traveled in the United States and Europe, and was favorably received as a spokesman of "young China," pleading for her advancement along modern democratic and economic standards. The Chinese emperor tried to have him kidnapped in London in 1896, while in the Chinese embassy, but he escaped.

In 1911, he returned to China at the beginning of the Wuchang rebellion, and in December of that year was elected provisional president by a national assembly at Nanking. Two months later the emperor resigned. Hoping to unite the republican factions, Sun Yat-sen voluntarily resigned as president, and yielded the office to Yuan Shi-kai. He soon realized, however, that Yuan Shi-kai was imperial in policy, even though he was called a president, and he revolted against the king-like executive. Defeated, he fled to Japan in 1913. There he met Rosamond Soong, whom he later married. She was born in Shanghai, but had lived many years in the United States, attending preparatory school in New Jersey, and college in Georgia.

During the revolution of 1917, the Radical party established a military government at Canton, and a state of war existed between the north (government at Peking) and the south. In 1921, Sun Yat-sen became president of South China. The nations were slow to recognize the new southern government, and Sun found himself facing an international boycott, when in 1924 various provinces, under ambitious warlords, fought against one another. While in the midst of the war, the southern President died from the effects of cancer.

Supe′rior, Wis., county-seat of Douglas County, is at the head of Lake Superior, on St. Louis, Superior and Allouez Bays. It is a terminus of the Great Northern; Northern Pacific; Chicago, St. Paul, Minneapolis and Omaha; the Duluth, South Shore and Atlantic, Minneapolis, St. Paul & S. Ste. Marie (Canadian Pacific), and Canadian Northern Railways. The city has a harbor line of about 30 miles, with extensive ore, coal, grain, lumber and merchandise docks, and shares with Duluth an extensive lake commerce although Duluth's share of the total volume is now much larger. Superior has a perfectly landlocked harbor, and is the natural outlet for all the country west of Lake Superior as far as the Pacific. Here is the largest dry dock on the Lakes, a steel plant costing $25,000,000 and three shipbuilding plants, one of which originated the whaleback (*q. v.*). It is the distributing point of the northwest for coal and oil. In 1882 an attempt to build a city was made four miles east on St. Louis Bay, which proved so successful that the two settlements united in 1891 and incorporated as Superior. The growth has been very rapid, the last census showing a gain of 30 per cent. Superior is the second city in Wisconsin, having a population of 40,384.

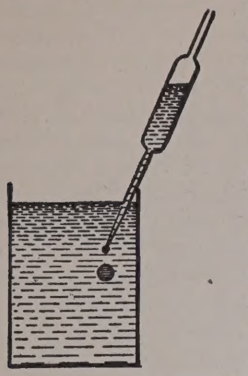
Superior and Duluth (*q. v.*), like Omaha and Council Bluffs, are "twin cities," although located in different states. They are connected by bridges.

Superior, Lake, the largest body of fresh water on the globe, is the highest and most western of the great lakes. It is bordered by Michigan, Wisconsin and Minnesota in the United States and Ontario in Canada. Its greatest length is 412 miles, its greatest breadth 167; and it covers 31,200 square miles, making it a little larger than South Carolina. The surface is $601^{8}/_{10}$ feet above sea-level, and its mean depth is about 475 feet, its greatest depth being 1,008 feet,—406 feet below the sea. Its surface is 20½ feet higher than that of Lakes Huron and Michigan, due to the fall at the rapids of St. Mary's River, the only outlet, where the average discharge is 86,000 cubic feet per second. Lake Superior is very near the watershed between Hudson Bay and the Mississippi, and so receives no large rivers, the largest being the St. Louis and the Nipigon. These rivers, with hundreds of small streams, drain 82,000 square miles into the lake. The largest island is Isle Royale, 44 miles long. Keweenaw Point reaches far into the lake. At Grand Isle Bay, about 100 miles west of Sault Ste. Marie, are the pictured rocks, sandstone cliffs from 50 to 200 feet high in many places, of fantastic shape and marked by bands and blotches of red and yellow. The boundary between the United States and Canada is drawn through the center of the lake from its outlet to the mouth of Pigeon River, but includes Isle Royale in the United States.

Surabaya (*sōō′rȧ-bä′yȧ*), a seaport on the northern coast of Java and on the Strait of Madura. Here the Dutch have a marine arsenal, a cannon-foundry and a mint. There also are machine, sugar and furniture factories. Population, 170,000, of whom 8,906 are Europeans and 13,035 Chinese.

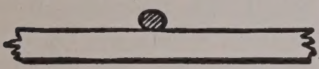
Surat (*sōō-rät′*), a city of India, on Tapti River, 160 miles north of Bombay. It stretches for more than a mile along the river in the form of a bow, and is surrounded by suburbs in the midst of gardens. There are four fine Mohammedan mosques, two Parsi fire-temples, three Hindu temples, a clock-tower 80 feet high and the old citadel. Surat was founded in the 16th century, and was three times burned by the Portuguese. After the building of a strong fort in 1546, Surat became one of the greatest trading-cities in India, the English and Dutch as well as the Portuguese establishing themselves there. By the beginning of the 17th century Surat traded with western Europe, India, Arabia, Persia, Ceylon and the East Indies. Here, too, the Mohammedan pilgrims embarked for Mecca. In the 19th century it was pillaged several times by the Mahrattas, lost most of its trade to Bombay, its new rival, and in 1800 came into the hands of the British. It later regained some of its trade and became the largest city in India, but was ruined by a fire, followed by a great flood, in 1837. Surat exported large quantities of cotton during the American Civil War. Population, 119,306.

Sur'face-Ten'sion is a phenomenon exhibited when two liquids (or a liquid and a fluid) which do not mix are brought into contact. For instance, a drop of oil placed in a mixture of water and alcohol, which has the same density as the oil, will neither sink nor rise; but it will gather itself into a sphere, *i. e.*, will assume a shape in which it has the least possible surface. In other words, it acts as if it were covered with a thin elastic skin which was continually tending to contract to the least possible area.



A DROP OF OIL FREED FROM GRAVITY

Another illustration of this phenomenon is seen when mercury is placed, in air, on glass, as indicated in the figure. The mercury does not flatten and run over the glass as it would do if gravitation alone were acting upon it; but it gathers itself into a more or less spherical shape. This globule is exactly what we should expect if the mercury were covered with a thin elastic membrane tending, all the while, to contract into the smallest possible area. This tendency of liquid surfaces to become a minimum is known as *surface-tension.* There is no skin or membrane over the surface of liquids; but the particles lying on the surface and very near the surface are in a different physical condition from the particles in the interior of the liquid; hence results this surface-effect, the details of whose explanation would lead us too far. The numerical value of the surface-tension of any liquid is *the force per centimeter which a single surface exerts* across any line drawn upon it. The unit in which surface-tension is measured, therefore, is *dynes per centimeter.* Consult C. V. Boys' *Soap-Bubbles and the Forces which Mold Them,* the finest elementary and popular treatment in the English language.



MERCURY ON GLASS

Sur'rey, Henry Howard, Earl of, an early English poet, was born between 1516 and 1518, probably in Suffolk, and was the son of the duke of Norfolk. In 1532 he accompanied Henry VIII to France, and spent a year in study at Paris with Henry's son, the duke of Richmond, who was betrothed to his only sister. In 1524 he was sent to Fleet Prison for challenging a gentleman to a duel, and next year suffered another imprisonment for breaking windows in the streets at night. In 1544 Surrey went to France as marshal of the invading army, and distinguished himself at the siege of Montreuil, where he was badly wounded. But next year he was defeated by a larger French force, and was superseded by the earl of Hertford. For his bitter speeches against Hertford he was imprisoned, and later, with his father, sent to the Tower, charged with high treason. His only offense was in having added to his own arms those of his ancestor, Edward the Confessor. In vain did he ably defend himself at his trial; he was found guilty and was beheaded on Jan. 21, 1547. His poems were published after his death, with those of Wyatt. They are sonnets, lyrics, elegies, paraphrases of *Psalms* and *Ecclesiastes* and translations. He was the first English sonneteer and one of the best. Consult Morley's *English Literature.* See SONNET.

Surveying (*sûr-vā'ing*), a branch of applied mathematics devoted to measuring land. There are two great branches: plane-surveying and geodesy. Plane-surveying is used where so small areas are measured that the surface of the earth can be looked on as plane. Where large areas are measured, as states and countries, the curvature of the earth must be taken into account and the science of land-measurement becomes geodesy. Plane-surveying is divided into such branches as land-surveying, having to do with fixing property-lines and areas of tracts of land; topographical surveying, having to do with levels and general contours of the landscape; hydrographical surveying, having to do with areas and depths of rivers, lakes and other bodies of water; mining surveying, having to do with the direction and lengths of mining shafts and galleries; railroad surveying; etc. One of the most important geodetic surveys now going on is the American coast-survey. It was started in 1832 by F. R. Hassler, and has now covered nearly the whole coast of the United States, the results being embodied in a sectional map on a scale of one mile to the inch. Eventually the whole country will be mapped out on this scale. Surveying and geodesy are applications of geometry and trigonometry, and involve the measurement of the length and directions of lines. All plane-surveying could be done by the measurement of lengths, but it is most convenient to measure angles also. The chief instruments are the chain or tape, compass, level and theodolite. In geodetic surveying instruments for measuring latitude and longitude must also be used.

The survey of public lands of the United States is in charge of a surveyor-general. The land is divided into townships, each six miles square. The townships between two meridians six miles apart make a range. The townships are then divided into sections a mile square, these containing 640 acres. Land-titles in the western states mostly refer to the original United States survey, and in this respect differ from the land-titles in the older states, where boundaries and corners are fixed by various natural and artificial marks. See Homestead-Laws and Preemption.

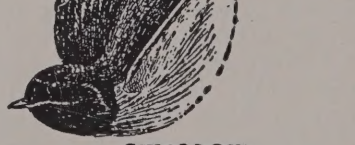
Susa (*sōō′sȧ*), a city of Persia, the Shushan of *Daniel* and *Esther*, the modern Sus and one of the most important cities of the Old World. Its name and ground-plan are traced on Assyrian monuments of the reign of Asur-banipal about 600 B. C. At the time of Daniel's vision "at Shushan in the palace" it belonged to Babylon, but it was brought by Cyrus under Persian rule, and the later kings made it the capital and winter residence of the Persian empire, building a strong citadel and a treasure-house. Alexander is said to have found vast treasures here, and, though Babylon soon became the chief city, Susa still was very rich when it fell into the hands of Antigonus (315 B. C.). Later, its fortifications were destroyed by the Arabs. Its ruins, among them the palace described in *Esther*, cover about three square miles.

Suspen′sor (in plants), an organ of the embryo, by means of which it is placed in proper relation to its food-supply. It is mostly restricted to the embryos of seed-plants, and is usually a more or less filamentous structure, at the end of which the embryo proper develops. See Embryo.

Sus′quehan′na River is formed by two branches. The north branch, 350 miles long, rises in Schuyler Lake in central New York; the west branch, 250 miles long, in the Alleghany Mountains. The two unite at Northumberland, Pa., and the river flows south to Harrisburg, southeast into Maryland and, after a further course of 150 miles, into the northern end of Chesapeake Bay. It is a shallow stream, much broken by rapids. In the spring immense quantities of lumber are floated down. Canals have been dug along its banks for 125 miles along the northern branch, and for 124 miles along the western branch. Its lower course is noted for ducks and other wild-fowl. Its chief branch is the Juniata. The Susquehanna is also noted for its wild and picturesque scenery.

Suttee (*sŭt-tē′*), meaning a virtuous wife, a once common usage of India, in accordance with which, on the death of her husband, the faithful widow burned herself on the funeral-pyre with her husband's body, or, if he died at a distance, was burned on a pyre of her own. The custom was practiced in India as early as the time of Alexander the Great, and was grounded by the Hindus on sacred books and laws of theirs. But no countenance to this barbarous rite can be found in the oldest and most sacred Brahman books. Nevertheless suttee, though not enforced on an unwilling victim and not practiced except in certain castes and families of old descent, was made almost necessary for well-born widows by the force of public opinion, unless they were willing to risk their own happiness here and hereafter. The rite came from a belief, common to many savage races, that it was well to send wives, slaves, horses, favorite weapons etc. with great men into the other world, by burying them with them, burning them or slaying them at their tomb. In 1823 about 900 widows were burned in India. In 1829, through the efforts of Lord William Bentinck, any encouragement of suttee was made murder. The custom is now rarely practiced.

Swabia (*swā′bĭ-ȧ*), a southwestern German duchy, stretching from Franconia to Helvetia and from Burgundy and Lorraine to Bavaria. It was so named from the Germanic Suevi, who drove out the Celts of this region in the 1st century B. C. The Alemanni became a part of the Suevic nation in the 5th century, and from this time there were dukes of Swabia. Under the Hohenstaufen emperors, who were Swabians, this duchy became the richest, most powerful and most civilized country in Germany. But when the Swabian line died, Swabia became the scene of feudal wars, and this unhappy state of affairs lasted for centuries. Swabia suffered terribly in the Peasants' War of 1525, in the Thirty Years' War (1618–48) and in the wars of the French Revolution. From the time of the Reformation the rulers of Württemberg (*q. v.*) struggled with the Holy Roman emperors for the control of Swabia. This struggle ended in the founding, in 1806, of the kingdom of Württemberg, which includes most of the old duchy. The name now denotes the south-central part of Württemberg, the adjoining part of Baden and the southwestern part of Bavaria.


SWALLOW

Swal′lows, insect-eating birds with long pointed wings, noteworthy for rapidity of flight. Blanchan speaks of the swallow as "the typical bird of the air, as an oriole is of the trees and a sparrow of the ground." There are about one hundred species in all parts of the world. Six are common in the United States. All devour an immense number of insects and are beneficial to the farmer. The common barn-swallow is widely distributed and abundant. It is a little larger than the English sparrow, has a wide wing-spread, above is of a glistening steel-blue shading into black, underneath a warm chestnut-brown and shining buff. tail noticeably slender and deeply forked. The nest is built sometimes outside, sometimes inside, a barn or other building. It is composed of mud-pellets mixed with straw and is lined with hay, feathers and other soft material.

> The swallow is a mason,
> And underneath the eaves
> He builds a nest and plasters it
> With mud and hay and leaves.

The four to six eggs are white with markings of brown and purple. The cliff or eaves-swallow is a square-tailed bird smaller than the barnswallow. It builds numerous nests in colonies under the eaves of barns, other buildings and cliffs. The bank-swallows are our smallest swallows, being about five inches long. They dig tunnels in sand-banks, making them two or three feet deep with a nest of grass and feathers at the end. The tree-swallow has a white under-body. It nests in hollow trees or in bird-boxes near dwellings. The rough-winged swallow resembles the bank-swallow. It is common in the west, making nests in sand-banks. The purple martin is the largest of our swallows, being about eight inches in length. Several swallows of similar appearance, and habitually seeking association with man, are to be found in South America. Swallows resemble the swifts or chimney-swallows and goat-suckers, but the latter belong to a different order. All swallows live in colonies. A pair is said to mate for life, but this may be but one of the numberless tales that make up the mass of tradition about this bird. Superstition has long protected the swallow, it being considered ill-luck to kill one.

See MARTIN; NESTING-BOXES; SWIFT.

Swamp, an area of wet, low land, soft and usually saturated, but not covered with water. Swamps are marshy lands with vegetation peculiar to such regions. Coarse grasses, rank and lush vegetation covers swamps. Often there are great trees. Drainage is the controlling factor in the variation of vegetation. Swamps with little or no outlet contain accumulated acids, plant decay products and root excretions in cold, poorly oxygenated soil. Xerophilous plants chiefly grow in such soil. Peat bogs or moors, and salt marshes are especially favorable to zerophytes.

Swampscott (*swŏmp′skŏt*), a town in Essex County, Massachusetts, is situated on Massachusetts Bay, adjoining Lynn and thirteen miles northeast of Boston. It is attractively situated. It forms a residential suburb of Lynn and is popular as a summer resort. The town hall contains a public library, and Phillips School is situated here. A fishing industry is the chief occupation of the town. The first settlement of Swampscott was made in 1629. It remained a part of Lynn until its incorporation as a separate town in 1852. The population in 1930 was 10,346.

Swan, a water-bird belonging to the family *Anatidæ*, whose members are famous for their long graceful necks, and related to ducks and geese. Other characteristics are the naked patch between the eye and the beak, and the similar plumage of both sexes. They inhabit temperate regions, and feed upon seeds, roots and fish-spawn. They have white plumage, except the black swan of Australia—a very beautiful bird with a long neck, having a graceful curve. It is a dull black, with white on the wings, and a carmine bill crossed by a white band. The European swan, partly domesticated in parks, is pure white and one of the handsomest of all birds. South America has a competitor for grace and beauty in the black-necked swan, a small swan with white plumage, except the head and neck which are dark seal-brown. The common swan reaches a length of about five feet and a weight of thirty pounds. The swans of North America are the trumpeter and whistler swans, with straighter necks and, therefore, less grace and beauty than other members of the group. They are smaller than the common swan.

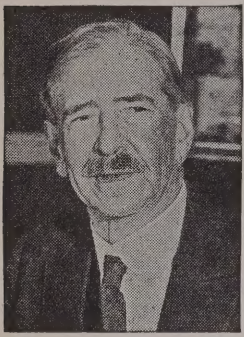
Swan, John Macallan, an English sculptor and painter, was born in Old Brentford in 1847. He studied painting under Gerome and sculpture under Fremiet. In 1878 he began to exhibit in the Royal Academy. In 1880 his *Prodigal Son* was bought for the Chantrey Collection in Tate Gallery, London. In 1894 he was elected to the Royal Academy of Art, and in 1899 became a member of the Royal Watercolor Society. The Fine Art Society held a special exhibition of his studies in its Gallery in 1897. Swan is considered the finest English sculptor of animals, especially in his treatment of structure, movement, and essential character. His paintings are poetical and evidence a fine sense of color. He died in 1910. Among his best-known works of sculpture are *Boy and Bear Cubs; The Wounded Leopard,* and *Puma and Macaw.* His paintings include *Orpheus; A Dead Herod; Lioness Defending her Cubs;* and *Polar Bears Swimming.*

Swan, Joseph Wilson, an English inventor, was born at Sunderland in 1824, and knighted in 1904. He founded the firm of Mawson and Swan. One of his first contributions to photography was to increase the rapidity of dry plates by heating the emulsion. He made several valuable inventions. Among them were the carbon or autotype process for securing permanent photographic prints, bromide paper and several photo-mechanical processes. He made improvements in electrometallurgical deposition. Swan also invented in other fields. In 1879, he exhibited the first incandescent electric lamp, for which he is most famed. His inventions brought him many honors, which included a fellowship in the Royal Society. He died in 1914.

Swansea (*swŏn′sē*), a seaport and the most important city of South Wales is situated at the mouth of the Tawe River, forty-five miles northwest of Cardiff. Its growth is due to its tin-plate manufacture, two thirds of the British output being manufactured here. It is also the principal seat of copper-smelting in Great

Britain and one of the most important copper-refining centers in the world. In the vicinity are extensive coal-mines. It has large docks, extending over sixty acres, a good harbor, and is several hours nearer the open sea than any other important port on the Bristol Channel. The McKinley tariff greatly injured Swansea's tin-plate trade. Its charter dates from the days of King John. A tower is still standing of the castle built here by the Earl of Warwick in 1099. It was burned to the ground in 1260, and twice rebuilt, but finally destroyed in 1647 by the Parliamentarians. It is now an interesting ruin. The population in 1931 was 123,941.

Swanson, Claude Augustus, an American statesman and Secretary of the Navy in the cabinet of Franklin D. Roosevelt, was born in Swansonville, Virginia, on May 31, 1862. He attended the public schools there, and was graduated from Randolph-Macon College in 1885. He received his LL B from the University of Virginia the year following. He began the practice of law at Chatham, Virginia. Swanson was a member of the national House of Representatives from 1893 to 1905. He resigned from that body to become Governor of Virginia, serving in that capacity from 1906 to 1910. In the latter year he was appointed United States Senator to fill the unexpired term of John W. Daniel. Swanson served for almost twenty-three years in the Senate resigning to enter the cabinet.


Claude A. Swanson
Sec'y of the Navy

During the World War, Senator Swanson became chairman of the Committee on Naval Affairs. He was one of the closest friends and strongest supporters of President Wilson. At this time, Franklin D. Roosevelt was Assistant-Secretary of the Navy. The two men formed a friendship during their close association in the affairs of the Navy. The result has been that Secretary Swanson has been the friend and adviser of two Democratic Presidents. Moreover, President Hoover selected him as the first delegate to the Disarmament Conference in Geneva, Switzerland, in 1932, where he became the American member of the naval committee.

Secretary Swanson's interest in the navy is of long-standing. He is known as a "Big Navy" man, and is outspoken in his conviction that the United States should have the strongest navy in the world, which is a natural attitude for a Virginian to adopt. As a member of the Naval Affairs Committee he aided in strengthening the Navy during the World War. Under his direction the first major building program for the Navy since the World War, was started. Secretary Swanson exercises general supervision over the Navy, and the Marine Corps. Some of the small islands belonging to the United States are governed through the Navy Department.

Swarthmore (*swôrth mōr*) **College,** a coeducational institution, is situated at Swarthmore, Pennsylvania, eleven miles southwest of Philadelphia. It was founded in 1864 by the Society of Friends, who gave it the name of Swarthmore Hall in England, the home of George Fox, who founded the Society. The single degree of Bachelor of Arts is given for courses of study in arts, science and engineering. Honor courses, similar to those in the English universities were introduced in 1921. Students who have made exceptional record in their first two years are permitted to read for honors in certain subjects. They do not attend regular classes, but meet once a week to discuss and read papers. A series of written and oral examinations given by a committee including professors from other institutions, determines on their standing. Swarthmore College is composed of twenty buildings on a site extending over 200 acres. The enrollment, which is limited, was 551 in 1933, with a faculty of eighty-four.

Swaziland. See Transvaal.

Sweatshops. The sweating-system is the engagement of men, women and children by a contractor to produce goods for the wholesale dealer, on which the workers are paid by the piece and the price is made as low as possible. It is called sweating because, as Charles Kingsley in 1850 first showed the world, it enables the contractor to keep cutting the price so low that even the ablest can just live by unceasing toil, while the less able, spurred to their utmost efforts, are often forced to go into debt to the contractor and thus to work for him, on his terms, at their utmost capacity until they can work no longer. Kingsley's revelations were followed by investigations. But the system has not been stopped. A congressional investigation in 1892 showed that 30% of all clothing manufactured in this country was made under the sweating system, under the following conditions: The sweating is done either in a "den," a room hired by the contractor, without any provisions suitable for a crowd of different sexes, and filled to its utmost capacity by people who can not afford to be clean or to stop working if sick; or else at home, where the garments or cigars are often handled by consumptives and filth abounds among the wretched toilers. They in many cases work fifteen hours a day, seven days to the week. The chief products of "sweating" are garments, cigars, candy and bread.

It is a common error to assume that only cheap clothing is made in sweatshops, whereas the fact is that cheaper clothing is more apt to be made in large factories where system and machinery reduce cost to the minimum; while the more expensive ready-to-wear garments, both for men and women, are often made in sweatshops. A number of states have laws against the evils of sweating system and require sanitary conditions; but an army of inspectors would find enforcement difficult, because the sweatshop workers depend on the contractors for their meager living, and by keeping on the watch and smuggling the garments into their homes, elude discovery. The formation of protective trade-unions among the workers is difficult, in view of the cheap labor poured into our cities from foreign countries. The action of the National Consumer's League in allowing its label to be placed only on goods made under decent conditions of work and of wages and in pledging its members to give the preference to such goods has produced some result, and only requires that all consumers support it.

Swe'den, the eastern portion of the Scandinavian peninsula, is a kingdom. It is over 600 miles long; its greatest width is 200 miles; and it covers 172,876 square miles.

Surface. In the northern parts the land rises from the Gulf of Bothnia to the Kiölen Mountains, which form the boundary between Sweden and Norway, their highest peaks rising above the snow-line. South of this region is the mountainous district made up of the great table-lands of Jemtland and the valleys of Herjedal and Ljungan, where there are good pasturage and timber-lands. The mountainous region further south, from Lake Siljan to Lake Wener, is the mining part of Sweden, and includes the noted iron-mines of Danemora and the copper-works of Fahlun. Lakes Wener, Malar and Hielmar almost cut the country from east to west and, with Lake Wetter, make up a large lake-district, which is the commencement of the most fertile part of Sweden, the lower end of the peninsula between the Cattegat and the Baltic. The lakes cover one eighth of the surface; the largest is Lake Wener, the outlet of which to the Cattegat is the Göta, noted for its picturesque rapids. The rivers are small and unimportant, the largest being the Angerman. Summer and winter succeed each other with almost no spring or fall.

Resources. Usually not enough grain is grown to supply the home-market, though barley does better than oats or rye. Other crops are potatoes, hemp, flax, tobacco and hops. Pine, fir and beech are of great value for timber, tar, pitch, charcoal and firewood. These trees mainly make up the great forests which cover more than a fourth of the surface. Bears and beavers are scarce; but wolves, lynxes, martens, eagles etc. are common. Copper, iron, alum, vitriol, marble, lead, sulphur and a little coal, gold and silver are found, mining is the most important business after farming. Iron and shipbuilding head the list of manufactures. Iron, timber and copper are the chief exports; yarn, wool, leather, coal and cotton the main imports.

Government. The three provinces are Norrland, Svealand and Gothland, but for purposes of government it is divided into 25 governments. After Stockholm the capital (341,986), the largest city, is Göteborg (167,813). The Swedish permanent army of 100,000 men is in part quartered on the landowners, the soldiers working in time of peace as field-laborers in return for their support; in time of war they are paid by the crown. Every Swede between 20 and 25 must serve in the national guard, and a reserve of 284,200 men is formed of conscripts between 21 and 40. Sweden is a constitutional and hereditary monarchy, the succession being in the male line. The king has a council or cabinet of ten ministers. The diet meets every year; the upper house has 150 members chosen for nine years, who must have a certain amount of landed property or income; the lower house has 230 members. A small property qualification is required in the voter, who must be a native having attained his majority.

Education. Education is compulsory, and there are free schools. The University of Upsala was founded in 1476, and has 1,835 students; and the smaller University of Lund numbers 874 students. There are 113 high schools with nearly 25,000 pupils, and 14 normal schools with 1,437 pupils. The state church, to which the king must belong is the Lutheran; but no civil disabilities attach to those not of the national religion.

History. In early times the Swedes lived in the north of Sweden and the Goths in the south. Eric Edmundson is said to have first conquered the whole of Sweden near the end of the 9th century. At this time Swedish history begins, and we find the Swedes generally at war with their Norwegian and Danish neighbors and busily ravaging the eastern shores of the Baltic. In 1000 A. D. Olaf Schooszkönig was baptized a Christian, and the burning of the national temple at Upsala in the reign of Ingiald (1080-1112) finished the overthrow of the old pagan religion. The murder of King Eric in 1161 was the beginning of a disastrous period of civil wars, lasting 200 years. At length the nobles offered the throne to Margaret, queen of Denmark and Norway, thus uniting the three Scandinavian countries in 1347. In 1523 Gustavus Vasa made Sweden again independent of Denmark, founded a long line of Swedish kings, of which he himself was one of the greatest, and raised half-barbarous Sweden to an honorable place among civilized nations. In Vasa's reign Protestantism was made the state's religion. Gustavus Adolphus (1611-32), one of the greatest generals of his age, spent the greater part of his reign in wars with Poland and Russia for the possession of Ingria, Livonia and other Baltic districts and in defending

Protestantism in Germany. His affairs at home were ably managed by the wise Oxenstierna, who, after the death of Gustavus at the battle of Lützen, carried on the government during the minority of Christina. This strange queen's most popular act was her abdication. Carl XI (1660-97) so greatly increased the kingly power that the diet acknowledged it to be absolute. The warlike career of gifted but reckless Carl XII (1697-1718), who humbled Frederick IV of Denmark and Peter the Great of Russia and dethroned Augustus II of Poland, nearly ruined his country. Ulrica, his sister was chosen queen on condition of giving up the absolute power wielded by the last two kings In the reign of Ulrica the last of the Vasas, and of her husband Frederick of Hesse-Cassel, the country was divided into two factions of nobles—the Hats or French party and the Caps or Russian party. Gustavus III (1771-2) who recovered the lost power of the crown and put down these factions, was murdered. Carl XIII (1809-18) was forced to cede Finland to Russia. Carl was childless and chose Bernadotte, Napoleon's general and prince of Pontecorvo, as crown-prince. Bernadotte's success in getting possession of Norway endeared him to the people, and he ascended the throne in 1818 as Carl XIV. He ruled ably, and was succeeded by his son Oscar I (1844-59) and his grandsons Carl XV (1859-72) and Oscar II (1872-1907). Gustav V, the present king, succeeded in 1907. In 1905 Norway dissolved the union with Sweden. Population 5,476,441. See CHARLES XII, CHRISTINA, GUSTAVUS ADOLPHUS, GUSTAVUS VASA, GUSTAVUS V, NORWAY and OSCAR II. See Fryxell's *History of Sweden* (English translation).

Swe'denborg, Eman'uel, was born at Stockholm, Sweden, Jan. 29, 1688, the son of a bishop and of noble family. He graduated at the University of Upsala, and, after four years travel, was given a position in the College of Mines by Carl XII, who became his friend. For some years he busied himself in writing a host of scientific works, mainly practical, on bridges, air-guns, docks, blood-circulation, copper-manufacturing, etc. Suddenly his scientific work stopped, and in 1749-56 appeared a Latin work which he called *Heavenly Secrets.* He announced that the Lord had appeared to him and sent him to be the herald of a new church and that his office was to interpret the word of God according to its true meaning. *The New Jerusalem and Its Heavenly Doctrine* and many other theological works followed. Swedenborg made no effort to found a church, but confined himself to the work of announcing the new doctrines which were to be its basis. As a man he was modest and retiring, genial and happy, and lived a most simple and quiet life. He died at London, March 20, 1772. Since his death, religious societies have been founded on Swedenborg's teachings, and are banded together in America as the general convention, in England as the general conference, of the New Church. Consult Wilkinson's *Life* and compare Emerson's essay in *Representative Men.*

Sweet'bri'er or **Eg'lantine,** a prickly shrub of the rose family, native of the eastern states of the Union and to Canada. It grows densely, yet reaches a height of six or eight feet; about midsummer it bears sweet-scented, pink flowers and later produces a scarlet or orange-red fruit. Its dark-green leaves emit a fragrant odor from their russet-hued glands. The sweetbrier is commonly met with in fields and country byways

Sweet Pea, (*Lathyrus odoratus*) a familiar garden-plant much prized for its beautiful perfumed flowers. There are not far short of 100 varieties in cultivation; and to raise them to perfection, the seeds should be planted two inches apart in a rich clay-loam, and it will be well to red-lead them, to protect them from mice and birds. As soon as the plants appear above ground, brush or small twigs should be spread around them for shelter, and later they should be given long stakes for support in their upward climb. Through the growing season occasional shallow cultivation will be required.

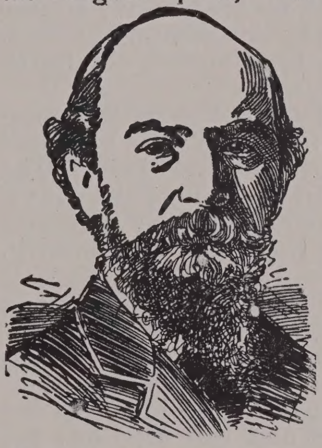
Sweet Pota'to, an edible, sugary vegetable, the tuberous root of a vine-like plant, grown largely in the southern states of the Union and in tropical and semitropical countries. It is also known as the sugar-yam. The sweet potato is rich in food-constituents (sugar and starch), the extent of its cultivation in this country being annually about 50 million bushels. Besides their use, cooked or canned for the table the sweet potato is also fed to farm-animals; it is grown best in sandy or loose soils, and is a staple crop in the south.

Swift or **Chim'ney-Swal'low,** a small bird abundant in the eastern United States, nesting in chimneys. Notwithstanding its common name, the bird is not a swallow (*q. v.*), having only a superficial resemblance to the latter birds, while in structure it is very different. It is closely related to the humming-birds and the goat-suckers. The bird is about five and one fourth inches long, of sooty-brown color, with a paler throat. The feathers of the short tail end is sharp bristles, which aid in climbing. There is only one kind in the United States east of the Rocky Mountains, but there are about 50 species inhabiting the warmer parts of the world. In most of them the salivary glands are highly developed, and the secretion from them is used as a glue to hold the nest together and to its support. In China one species constructs a nest that is used in making soup.

Swift, Jon'athan, was born at Dublin, Ireland, Nov. 30, 1667, after his father's death, and was brought up in poverty, what little support he had being furnished by relatives. He spent seven years at Trinity College, Dublin, most of the time in disgrace with the authorities. He was taken then into the family of Sir William Temple, the politician and ex-minister. Four years later his pride drove him away from his patron's house, and he became a clergyman. But he soon threw up the Irish living he had had for two years, and went back to Sir William's service, remaining there till his patron's death in 1699 and publishing an edition of Temple's works (1700-03). In 1704 appeared his first work, *A Tale of a Tub* the wildest and wittiest satire of the 18th century. This work cost him a bishopric and forced him to be contented for life with the deanery of St. Patrick's, Dublin. In politics he at first was a Whig, but in 1710 he joined the Tories and became easily the most powerful pamphleteer in England, *The Conduct of the Allies* being an English classic. The death of Queen Anne put the Tories out of power, and Swift retired to St. Patrick's. His famous *Drapier's Letters*, written in 1724 against the copper-money which was to be supplied to Ireland by a man who had bought the right from the English government, made him at once bound the most popular and most powerful man in all Ireland. A reward of $1,500 was offered for the name of the author, but no one of the many in the secret thought of betraying him. At last the scheme was given up. In 1726 Swift published his most popular work, *Gulliver's Travels.* Almost as great a masterpiece is *The Modest Proposal,* in which he suggests, in seeming cold blood, that in order to relieve their poverty and distress the Irish should sell their children as food for the rich. Swift died on Oct. 19, 1745. See John Forster's *Life of Jonathan Swift* and Thackeray's *English Humorists.*

Swim'ming. The weight of the human body is so little greater than that of water, that it can readily be floated, especially when as in swimming, it is forced through the water by the arms and legs. Benjamin Franklin suggested, as a good way to learn to swim, to wade out breast deep and, tossing an egg into the water in the direction of the shore, to plunge after it; it will soon be discovered that it is easier to swim than to sink. In swimming on the breast the stroke is made by vigorously kicking out the legs—previously bent up—and at the same time thrusting the arms straight ahead in the form of a wedge, then drawing up the legs for another stroke, while the arms are swept through the water in the form of a half-circle. The stroke is made most powerful by keeping the feet as widely apart as possible. Breast-swimming is the easiest method and is always used for long distances. A faster way is to swim on the side; the under arm only being thrust forward, while the other is thrust downward and backward. In over-hand swimming each arm is thrown out of the water alternately, the swimmer at the same time turning from side to side; this is the fastest method. In swimming on the back the arms are not used at all. In treading water the swimmer stands upright and treads water as if walking up a pair of stairs. In floating the swimmer lies on his back, keeping only his face out of the water. It it easier to swim in salt than in fresh water, as the former is more buoyant. The Greek story of Leander's famous swim across the Hellespont was made probable by Lord Byron performing the same feat in 1810. In 1875 Matthew Webb, an Englishman, swam 20 miles in four hours and 42 minutes, and the same year swam the English Channel from Dover to Calais, the tide carrying him on a zigzag of about 50 miles in 22 hours. Agnes Beckwith, a 14-year-old girl, swam five miles in 67 minutes.

Swinburne(*swĭn'bûrn*), **Algernon Charles,** an English poet, was born at London, April 5, 1837, the son of Admiral Swinburne. He was educated at Balliol College, Oxford, and spent some time in study in France. Two plays, *Queen Mother* and *Rosamond,* were his first writings, followed by his best-known poem, the tragedy of *Atlanta in Calydon.* His later poems are *The Armada* and *An Autumn Vision.* Swinburne enjoys great popularity in America as well as in England, being especially remarkable for his facile metrical invention: and for a time was under consideration as successor to Tennyson in the English laureateship. His chief prose-writings include *Shakespeare, Ben Jonson, Victor Hugo, Wm. Blake, Essays and Studies* and *Prose Miscellanies.* Died April 10, '09


ALGERNON C.SWINBURNE

Swine or **Hogs** are among the most important of food-animals. For the wild boars, from which swine are probably descended, see Boar. The word boar is now used of the male hog; the female is termed sow; and the young are called pigs, and the flesh pork. A sow has two litters a year of eight to twelve pigs each or even more. Fresh pork is held to be unwholesome in warm countries, but salted and smoked or otherwise cured, it is a favorite and healthful food in warm climates. The fat, as lard, is largely used in cooking; the bristles are used in making brushes, and the skins make a tough and flexible leather, used in the manufacture of saddles, trunks and other forms of leather goods. Much attention has been given to the breeding of swine with a view to improvement in respect to increased size, hardiness, early development, fattening qualities, flavor of the pork, etc. Among the popular breeds are the Berkshire, from the English county of Berks; the Poland-China, which was first bred in Ohio; the Chester Whites, an American strain of the Yorkshire; the Durocs or Jersey Reds, and the Tamworth. Pork-packing is one of the great branches of business in the United States. Its leading centers are Chicago, Kansas City and Omaha, in the order named. In the year ending on March 1, 1907, the number of hogs packed and marketed was 30,978,000; the total value of the hog-products exported from the United States in 1905–6 was $128,996,441. See STOCK-RAISING and STOCK-YARDS.

Swit'zerland, an inland country of central Europe and a federal republic. Its greatest length from east to west is 180 miles, its greatest width from north to south 130 miles, and its area 15,976 square miles. It lies between Austria on the east, France on the west, Germany on the north and Italy on the south.

Surface. Switzerland is the most mountainous country on the globe. Its principal chains are the Alps and the Jura. The Alps run from east to west along the southern or Italian frontier, and their windings and spurs fill more than half the country. The mean height of the highest chain is from 8,000 to 9,000 feet. The Jura run northeast from the western corner of Switzerland, and are a series of parallel ridges shutting in long and narrow valleys; their mean height is not over 4,000 feet. In the angle between them and the Alps lies the plain of Switzerland, 1,400 feet above the sea and 100 miles long by 20 to 30 broad. East of this tableland is the Thur hill-country between Lakes Zürich and Constance. The Jura, the plain and the hill-country are the main divisions of northern Switzerland. The Alpine region is divided into the valleys drained by the Rhône; those drained by the Ticino; the Grisons, valleys drained by the branches of the Rhine and Danube; the Bernese Oberland, sloping toward the plain of Switzerland; and the Forest cantons, surrounding Lake Lucerne. Everywhere above 9,500 feet high the mountains are covered with everlasting snow, which descends along the hollows in glaciers to a much lower level, and in this way covers the higher parts of the country with a vast sea of ice. The lowest part of Switzerland is in the valley of the Rhine, between Constance and Basel and the banks of Lakes Zürich and Maggiore.

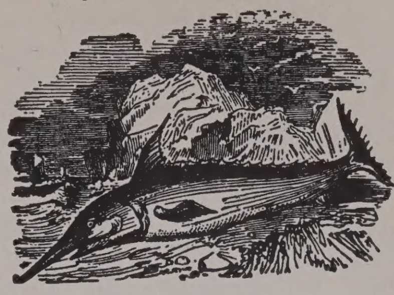
Resources, Manufactures, Commerce. Good coal is not to be had, and the houses are mostly wooden, so that the forests, which cover one sixth of the surface, are very valuable. The trees, cut on the heights and trimmed of their branches, are slid down the icy slopes to the valleys below and loaded on rafts. The chief business is that of the herdsmen and shepherds, who spend the summer with their cattle on the mountains, living in rude huts called châlets, and there the butter and cheese are made. The plain of Switzerland is a rich farming-region; large quantities of grapes are grown at Vaud and Neuchâtel, and the orchards of the Thur country and Lake Constance furnish *kirchwasser*, the common drink. Out of every 100 square miles 30 are filled with rocks, glaciers and water; 17 with forests; 11 with plowed lands; 20 with meadows; and one with vineyards. The manufactures are chiefly confined to the northern cantons — silk in Zürich, Aargau, Glarus and Basel; cotton in Zürich, St. Gall, Appenzell, Aargau, Glarus and Neuchâtel; watchmaking in Geneva and Neuchâtel; straw plaiting in Aargu and Lucerne. Though without a seaport, Switzerland's trade in proportion to population has long been greater than that of any European country, except England. The chief imports are wheat, salt, raw silk and cotton; the chief exports are cheese, condensed milk, food-stuffs, charcoal, cattle, silks, cottons, watches and jewelry.

Government, Education, Communication. Each of the 25 cantons of Switzerland rules its home-affairs, in some of the cantons by means of a representative assembly, in others by the *landesgemeinde* or assembly of all the men in the canton. The federal legislature has two houses, the state council and the national council. The president, elected by the federal assembly for one year, has little power, being merely one of the federal council of seven, which is chosen for three years. Almost every head of a family has his plot of ground, and there are no great estates or powerful landowners. There is no standing army, but every citizen is obliged to serve as a soldier. Children are taught at school to bear arms, from the age of eight passing through annual exercises and reviews. In eighteen cantons German prevails; in five, French; in one Italian; and in one, Roumansch, a Latin dialect which lingers in the Grisons. Basel, Bern and Geneva are the centers of the Protestant part of Switzerland, while the Alpine region is almost wholly Catholic. Three years' schooling is required for every child, and in every district are primary and secondary schools. There are many higher and specialized schools that are largely attended; and universities at Basel, Bern, Zürich, Geneva, Lausanne and Fribourg

Basel University dates to 1460. The attendance in the universities is 5,626, with a total teaching staff of 641. Switzerland has 1,805 postoffices; 2,969 miles of railway; and a very complete system of telegraphs, which is almost wholly under state control. The chief towns are Zürich (189,088), Basel or Bâle (131,914), Geneva (125,520), Bern (85,264) and Lausanne (63,926).

History. The first people of Switzerland were the Helvetii in the northwest and the Rhætians in the southeast, both of whom were conquered by the Romans and had parts of their territories settled by Burgundians, Alemanni and Goths. From the 5th to the 7th century Christianity was adopted. In the early part of the middle ages the country formed part of the Holy Roman empire. In the 13th century civil wars broke out, during which many of the towns obtained special rights and charters. The attack of Emperor Albert I on the great towns caused the men of the forest cantons in 1307 to begin a war against Austria, which gained them freedom in 1315. A league of eight cantons was formed in 1352, followed by other wars with Austria, ending with the famous Swiss victory of Sempach. In 1415 Aargau and Thurgau were conquered from Austria, and Ticino, beyond the Alps, was annexed three years later. In 1476 the battles of Granson and Morat (Murten) were won from Charles the Bold, and in 1499 Emperor Maximilian, was defeated in six engagements. Zürich, under the preaching of Zwingli became a Protestant city in 1523, followed by Bern and other northern cantons. A religious war was waged against the Roman Catholic forest cantons, in which the Catholics were successful. In the treaty of Westphalia, at the end of the Thirty Years' War in 1648, the European states acknowledged the independence of Switzerland. The French seized Switzerland in 1798, but it recovered its freedom in 1814. The powers of Europe then guaranteed its perpetual neutrality and the inviolability of its territory. Since that time the chief events have been local rebellions and other attempts of the people in the various cantons to get back powers which they had gradually lost to corporations and great families. In 1844 the radical party organized bodies of armed men, called the Free Corps, for the purpose of driving out the Jesuits. The Roman Catholic cantons formed in their defense the league called the *Sonderbund*. After several town-revolutions a majority of the federal diet declared against the Jesuits and the *Sonderbund*, and waged a successful civil war against the Catholic cantons. The present constitution was chosen in 1874. Population 3,741,971. Consult Zschokke's *History of Switzerland* (English translation); *The Swiss Confederation* by Adams and Cunningham; and *Switzerland* in the Story of the Nations Series.

Sword'fish', a large fish of the open sea, having the bones of the upper jaw extended into a long blade. There is only one species, found abundantly in the Mediterranean, less abundantly along the New England coast. It is also found in the Pacific and other seas. The body is rather elongated but stout, the dorsal fin high, the ventrals absent. These fish are dark-blue in color, and range in length from four to fifteen feet or more and from 150 to 800 pounds in weight. They eat nearly all kinds of fish. Rising in the midst of a school, they strike several with the sword and eat them deliberately. They are sought as food, and harpooned from the bowsprit of small vessels. In former years about one and one half million pounds, annually, were brought into eastern ports of the United States.

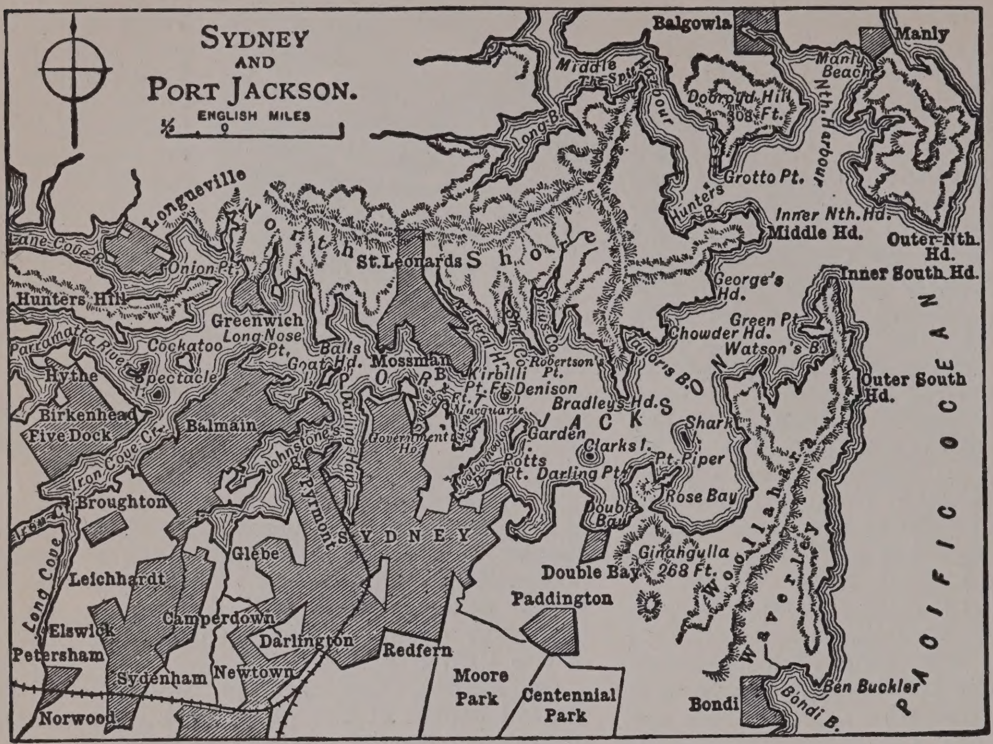


SWORDFISH

Syc'amore, the common name in the United States of the plane or buttonwood, well-known for its white bark, broad leaves and round balls. The true sycamore is a species of fig, common in Egypt. The wood is so lasting that it was used for mummy cases. It is the tree mentioned in the Bible. The plane or buttonwood is a tree of infinite dignity, rises to a considerable height, and lives to a great age. The height is from 60 to 100 feet, the branches are of wide-spreading habit, and the free peeling of the dark outer bark reveals the glistening white inner bark and gives a mottled appearance to trunk and branches. The tree is vigorous, foliage abundant, leaves bright yellow-green above and paler below. On into winter the fruit remains on the tree, brown balls hanging from the ends of long peduncles. It is a favorite shade-tree, and is distributed generally in the country, being found in rich bottom-lands and along the banks of streams. The wood is reddish brown. Though not strong, it has a beautiful grain and is used for furniture and interior finish, and is also employed for cigar-boxes.

Syd'ney, a city of Australia, the capital of New South Wales (*q. v.*), is on Port Jackson, a bay of the Pacific Ocean. The city looks like an old English town, with fine public buildings, as the exchange, the government-house, the parliament-houses, the treasury, the museum, the national art-gallery, the university and two cathedrals. It has fine parks and a botanical garden of 38 acres.

There are four colleges connected with the university, which has a faculty of 76 members and an attendance of 1,054 students. There also are a college for women, a free museum, a public library of 179,641 volumes and an observatory. It has a fine harbor, with extensive shipyards and docks, and is defended by several forts and batteries. Population 850,000. See Australia.


SYDNEY AND PORT JACKSON.
ENGLISH MILES
½ 0
Balgowla
Manly
Manly Beach
Middle
The Spit
Harbour
Long B.
Dobroyd Hill 308 Ft.
Nth. Harbour
Grotto Pt.
Hunters B.
Inner Nth. Hd.
Middle Hd.
Outer Nth. Hd.
Inner South Hd.
Longueville
North Shore
St. Leonards
Lane Cove R.
Onion Pt.
Hunters Hill
Greenwich
Long Nose Pt.
Parramatta River
Cockatoo I.
Spectacle I.
Hythe
Balls Hd.
Goat I.
Mossman
Neutral H.
Sirius Co.
Robertson's Pt.
Kirbilli Pt.
Ft. Denison
Ft. Macquarie
George's Hd.
Chowder Hd.
Green Pt.
Watson's B.
Taylor's B.
Outer South Hd.
PORT JACKSON
Bradley's Hd.
Garden I.
Clarks I.
Shark I.
Pt. Piper
Rose Bay
Birkenhead
Five Dock
Balmain
Johnstone's B.
Darling Harb.
Government Ho.
Woolloomooloo B.
Potts Pt.
Darling Pt.
Double Bay
Iron Cove Cr.
Broughton
Pyrmont
SYDNEY
Glebe
Leichhardt
Long Cove
Ginahgulla 268 Ft.
Woollahra
Waverley
Paddington
Camperdown
Elswick
Petersham
Darlington
Redfern
Sydenham
Newtown
Moore Park
Centennial Park
Norwood
Bondi
Bondi B.
Ben Buckler
PACIFIC OCEAN

Sydney, Canada, next to Halifax, is the largest town in Nova Scotia. It is a coal-shipping port and is equipped to accommodate ocean-liners. It has a deep-water harbor open throughout the year. Population, nearly 30,000.

Symbiosis (*sĭm bĭ-ō′sĭs*) (in plants), the living together of two kinds of organisms in more or less intimate relation. The word sometimes has a very general application, including even such a case as a vine and the tree upon which it climbs. Generally, however, it is used only in connection with cases of intimate organic union. The most notable case is the association of an alga and a fungus in the formation of a lichen. Various forms of symbiosis are recognized, dependent upon the significance of the relationship between the two symbionts. Parasitism is one form, in which one symbiont is more or less injurious to the other. This form is amply illustrated by the numerous cases in which parasitic fungi attack living plants and animals. Mutualism is that form of symbiosis in which the relation between the two symbionts is mutually helpful. Many botanists consider the lichen an illustration of this, in which the alga and fungus are of help to one another. Helotism is a form of symbiosis in which one organism enslaves another to use its products. In this case the enslaving symbiont is benefited, while the enslaved symbiont is neither injured nor benefited. Many botanists think that this is the form of symbiosis displayed by lichens, the fungus enslaving the alga in order to obtain the food which it manufactures and still protecting it within the meshes of the mycelium. Root-tubercles and mycorrhiza also are illustrations of symbiosis of complex character. In fact, the phenomenon of symbiosis is displayed more extensively among plants than was formerly supposed. See Lichens, Mycorrhiza and Root-Tubercles.

Symmes, John Cleves, an American pioneer, was born on Long Island in 1742. He obtained from Congress in 1788 a grant of 1,000,000 acres along the Ohio between the two Miami Rivers, and a colony from New Jersey made the first settlement, naming the town Losantiville, which was changed by Governor St. Clair to Cincinnati. Symmes City also was founded at North Bend, a few miles below, and for some years was a rival of Cincinnati, until Fort Washington was established at the upper town.

Symmes, John Cleves, nephew of the above, was born in 1780 in New Jersey. He was in the War of 1812, and afterwards settled at Newport, Ky., where in lectures and writings he developed his idea that the earth is a hollow globe, and can be inhabited. He died at Hamilton, O., May 28, 1829.

Symonds (*sĭm′undz*), **John Addington,** an English man-of-letters who wrote largely on Italian history and literature, was born at Bristol, Oct. 5. 1840, and died at Rome, April 19, 1893. His chief writings are an *Introduction to the Study of Dante; Studies of the Greek Poets; The Renaissance in Italy; Italian Byeways;* with *Lives* of Shelley, Ben Jonson, Sir Philip Sidney, Boccaccio, Benevento Cellini, Michael Angelo, Walt Whitman and *Shakespeare's Predecessors in the English Drama.* His work is marked by accurate learning and much critical insight. *The Renaissance in Italy* is his chief work.

Sympathet'ic Nerv'ous Sys'tem, a nervous system developed in vertebrated animals above the fishes. It consists of a double row of ganglia united by nerve-trunks, and is located within the cavity of the body, along each side of the spinal column. In this way two chains are formed, reaching from the base of the skull to the end of the body-cavity. The ganglia are collections of gray matter or nerve-cells, and nerve-fibers pass through them to and from the spinal cord. The sympathetic system is connected with the central nervous system by numerous nerve-trunks or communicating branches. It also sends branches to the viscera. It acts as a kind of relay center for regulating the blood-supply to the abdominal viscera and assisting in other involuntary actions. See Gray's or Quain's *Anatomy* for a longer description.

Sympetalous Flowers, those in which the petals are more or less united, as distinguished from those which are polypetalous. The sympetalous condition is characteristic of families of the highest rank, in which the corolla takes such forms as a bell, urn, tube or trumpet. See Flower.

Synagogue (*sĭn'ȧ-gŏg*), the Jewish house of worship. They were first established in Judaea, when the country was under the Greek and the Persian rule, and were sometimes used for schools. The synagogue has seats and desks on the floor for the men and galleries for the women. There are an ark containing the Hebrew copies of the books of Moses, a platform for the reader, a smaller platform for the preacher and in modern synagogues, a place for the choir. The congregation must face the east while certain prayers are recited.

Syncarpous Flowers, those in which two or more carpels are organized to form a single pistil, commonly called a compound pistil. See Flower.

Syndicalism, the socialistic philosophy which teaches that collective ownership by the workers of the means of production should be gained by direct action, namely, by the general strike and sabotage. Sabotage is the destroying or marring of the product as it passes through the hands of the workmen in the factory. Syndicalism is opposed to government because the latter upholds the rights of property and the capitalist class. It preaches unremitting class war. The International Workers of the World endorse its principles.

Synergids (*sĭn'ẽr-jĭds*) (in plants), two cells which are associated with the egg in angiosperms, and with it form the group of three cells, called the egg-apparatus. This group is situated at the micropylar end of the embryo-sac, to which the pollen-tube comes. The name means helpers, and refers to the fact that these cells are of service in the process of fertilization. During this process one of the synergids becomes disorganized, contributing of its substance to the nourishment of the pollen-tube and its contents. See Embryo-Sac.

Syr'acuse (*sĭr'ȧ kūs'*), **N. Y.,** county-seat of Onondaga County, is on Onondaga Lake, about halfway between Albany and Buffalo. It is a handsome city, with broad, shaded streets and ornamental squares. The state armory, asylums for weak-minded and three asylums for orphans, a home for aged women, savings-bank, courthouse, the new high school, Kirk Block, John Crouse College of Fine Arts, the Hall of Languages and the First Presbyterian church are among the noteworthy buildings. The manufacture of salt has been an industry since 1654 when the springs were visited by the Jesuits and the salt carried to Quebec. The supply is supposed to be inexhaustible, but the brine does not produce the best quality of salt; which is still obtained from the local wells to the extent of 2,000,000 bushels per year. In 1870 the output was over 8,000,000 bushels, but there is lively competition now at Warsaw and in Michigan. The extensive works of the Solvay Process Company are the principal industry, 2,800 men being employed and $5,000,000 invested. Caustic soda, bicarbonate of soda, soda-ash and crystals are the principal products, but carbolic acid, picric acid, coke, ammonia, tar and other coal-tar products are also made by this company. Brine is brought through iron pipes to the works from wells which the company sank 20 miles from the city. It was in the sinking of these wells that the main source of the brine, which had so long been used in Syracuse, was located in a mass of solid salt. Into some wells it was found necessary to discharge fresh water. When it became saturated it then was pumped to other wells and through pipes to the works. The limestone used by this company is brought from Split Rock. Large buckets, suspended on overhead wires and operated by steam-power, carry the material. They run in close connection and continuously, carrying 1,000 tons in 12 hours. The "waste" product is white like marl, possessing no sustenance for vegetation, but has been used to fill the surrounding lowlands. In this way hundreds of acres have been filled to a great depth Besides this enormous business, typewriters and automobiles are extensively manufactured, as are recorders, chilled plows, furniture, candles, chinaware, mince meat, clothing, tool steel, caskets, carriages, chemicals, drop forgings, shoes, fire escapes, and shot-guns. In the city are Bessemer steel-works, blast-furnaces and foundries. In fact, Syracuse, first renowned as a salt manufacturing city—which industry tipped the beam in favor of the construction of the Erie Canal—

has become a city of diversified industries. The city has an excellent public school system, many churches and hospitals, and a large public library system. In the Court of Appeals is a library of value, supported by the state. Syracuse was first settled by an Indian trader in 1787. In 1780 it was called Salt Point, and the manufacture of salt begun by white settlers. The place was soon called Salina, and grew slowly until it was incorporated as a village in 1825. In 1847 Salina and Syracuse, which, prior to that time had been rival villages, were united under the name of Syracuse. Population 225,000. See SYRACUSE UNIVERSITY.

Syracuse or **Siracusa,** a city, once the largest city of Sicily, its walls being 22 miles around and its inhabitants numbering anywhere from 500,000 to 1,000,000. It was formed of five towns, and sometimes was called Pentapolis. Ortygia, the first part of Syracuse, was built on a small island, connected with the mainland by a causeway. The modern city is fortified, and has palaces, churches, convents and a fine cathedral, built on the site of the ancient temple of Minerva. There are many ruins of the ancient city — the old theater, cut out of the rocks, with sixty rows of seats, for 24,000 spectators; ancient quarries, 60 to 80 feet deep, sometimes used as prisons, one of them being called The Ear of Dionysius; a great aqueduct; and extensive catacombs. The fountain of Arethusa, on the island of Ortygia, has been restored by the city. The trade is in wine, brandy, oil, fruits, salt, saltpeter and sulphur. Syracuse was founded by the Corinthians in 734 B. C., and grew rapidly, sending out several colonies. The government was in the hands of a few leading families, and in 487, after a revolution in which the people had driven them out, they returned, and Gelon, the despot or tyrant, became master of Syracuse. He was a great ruler and the city prospered under him, as also under the reign of Hiero, his successor. In 466 Thrasybulus was expelled, and the city enjoyed a free government for 60 years, during which it was victorious over Athens. Dionysius restored the "tyranny," strengthened the city, and overcame Carthage. In 212 B, C. the city, which had joined the Carthaginians, was conquered by the Romans. It was burnt by the Saracens in 878, and has been three times nearly destroyed by earthquakes. Population 32,030. See SICILY.

Syracuse Univer'sity, Syracuse, N. Y., is a coëducational institution. It has Colleges of Liberal Arts, Fine Arts, Medicine, Law Applied Science, a Teachers' College, the New York State College of Forestry, and Agriculture, a Graduate School, a School of Oratory, Library School, Summer School, and a School of Photography. It is picturesquely situated on a hill overlooking Onondaga Lake, and was founded in 1870. The faculty numbers 315, the students 7,000. Syracuse University is well endowed and has a library of 100,000 volumes.

Syria (*sĭr'ĭ-ȧ*), division of Turkey, lying on the Mediterranean Sea between Asia Minor and Arabia, including 114,530 square miles. The country is crossed from north to south by a double mountain-chain, Lebanon, the highest part having its summit 10,000 feet above the sea. The valley between the two ranges, Lebanon and Anti-Libanus, is about 2,300 feet above the sea, and was the site of the cities of Heliopolis and Baalbek. This valley separates into two parts, through one of which the Leontes River makes its way to the Mediterranean, while the other descends rapidly to the valley of the Jordan. At the Lake of Tiberias the valley is 650 feet below the level of the sea, and at the Dead Sea, 60 miles below, it is 1,300 feet below sea-level. The region around the Dead Sea is full of salt and without vegetation. The coast is broken by the bays of Tripoli, Beirut, Acre and Saida. The Jordan, Litany (Leontes), Asi (Orontes), Barada and Awaj (the Abana and Pharpar of the Bible) are the principal rivers, with the Euphrates on the eastern border. The plains of Esdraelon, Sharon and Gaza are level tracts, and the region around Damascus is a sandy desert in which are the ruins of Palmyra. Iron, quicksilver, coal, salt and bitumen are the minerals. The climate varies from the cool summers of the slopes of Lebanon to the tropical heat of the Jordan valley, with a dry season from April to October. In spite of imperfect methods and ancient implements in agriculture, the crops are large. Wheat, barley, rice, cotton, hemp, indigo and tobacco are important crops, while all kinds of fruit are grown. Vineyards cover the hills, and forests of cedar and pine the mountains. The horses are very strong and handsome; the broad-tailed sheep is found here only; cattle are small and poor; and wild animals abound in the mountains. Manufactures are unimportant, though the rearing of silk-worms is carried on extensively. Its chief city is Damascus, with a population of 350,000.

The people are of many races and sects. The Mohammedans are mostly Arabs, though there is a small proportion of Turks, the ruling race. The Mohammedans, Druses, Maronites, adherents of the Greek church, Armenians, Catholics, Protestants and Jews represent the religious divisions. The schools are carried on mainly by the Greeks, Catholics and, especially, by the American Protestant missionaries, who founded the Presbyterian college at Beirut. The Syriac language belongs to the Semitic group, and is an Aramaic dialect. Ancient Syriac still is the sacred language of the remnants of the Christian churches of Syria and Asia Minor, though it practically is a dead language even to the best educated among them. The oldest book in Syriac still existing is a translation of the Bible, made about 200 A. D.

The kingdom of Damascus, which occupied the central part of Syria, was conquered by the Assyrians about 740 B. C. Along the Mediterranean was Phœnicia, with such cities as Tyre and Sidon, the greatest commercial nations of the ancients, but conquered also by the Assyrians. Anakim, Canaanites, Ammonites and Moabites were tribes living beyond the Jordan and in the southwestern parts of Palestine. The entrance of the Israelites into Palestine took place about 1500 or 1300 B. C., and their power lasted 1,500 years. A part of the nation, the ten tribes, were taken captive by the Assyrians in 721, the Samaritans found in the country at the time of Christ being descendants of the remnant of the Israelites and the colonists from Babylonia, that took the place of the captives. Judah fell before Nebuchadrezzar, but the people were restored to their land after 70 years of exile, though the country was still governed by Persian rulers. The battle of Issus (333) gave Syria to Alexander the Great, but at his death the country was divided, Egypt holding Palestine and Seleucus Nicator ruling northern Syria, where he built Antioch, for many centuries one of the greatest of eastern cities. Syria was conquered by the Romans about 63 B. C., and ruled by Roman officers. In the 7th century A. D. it became a part of the Mohammedan empire, and in the 11th century was in the hands of the Seljuk Turks, whose cruel treatment of Christian pilgrims led to the crusades. The Christian princes ruled only a short time, the land being overrun by the Mamelukes and the opposing forces of Tamerlane. Since 1517 it has belonged to the Ottoman empire. Population 3,675,200. See JEWS and PALESTINE.

Syrin'ga, a genus of Old-World plants, natural order *Oleaceæ* (lilac). They are deciduous shrubs, comprising six known species, native of southeastern Europe and Asia. Flowers in terminal panicles and very fragrant. The term, as popularly used, signifies the beautiful shrub, *Philadelphus Coronarius*, a native of Japan, often seen in gardens and commonly known as sweet syringa or mock-orange. Its cream-colored, fragrant flowers somewhat resemble orange-blossoms.

T

T (*tē*), the twentieth letter, is a nonvocal consonant. From its mode and place of articulation, the tongue touching the gum behind the teeth, it is classed as a voiceless dental or as a palatal, as in *tie*, *it*, *note*. *T* is silent in some words, as *chasten*. Unaccented *ti* before a vowel is *sh*, as in *nation*. *T* before diphthongal *u* (that of *use*) is *tsh*, as *nature*. *T* with *h* forms *th*, soft as in *baths*, *though;* hard as in *bath*, *thin*. *Th* is *t* in *Esther*, *phthisic*, *Thames*, *Thomas*, *thyme;* and is silent in *asthma*, *isthmus*.

Tab′ernacle was the tent first raised by Moses in the desert as a sign of God's presence among the people. It was divided into the sanctuary proper, which formed the front part, and the holy of holies. A sort of court-yard, formed by curtains hung between columns, ran round the tabernacle. The entrance was toward the rising sun, and was shut in by another costly curtain, into which, as in the first covering, figures of cherubim were woven. The court was much larger on the eastern side, for here the people gathered to worship. Here also stood the altar, made of acacia wood, on which a fire was kept burning, and the brazen laver or basin. The sanctuary contained the gilded table holding the show-bread, the golden candlesticks and, in the center, the golden altar of incense, upon which the high priest burned incense morning and evening. In the holy of holies was kept the ark of the covenant, an acacia box gold-plated and gold-lined, in which were kept the two tables of the Ten Commandments. On top of the ark were the two cherubim, and between them the symbolical presence of Jehovah — the shechinah. Only once a year, on the Day of Atonement, did the high priest enter the holy of holies, while the sanctuary was the ordinary place of the priests, and the court that of the Levites. The Levites had charge of the tabernacle, carrying it from place to place on the march of the Israelites. The tabernacle was permanently set up in Shiloh, and was probably removed to Nob and thence to Gibeon, from which Solomon seems to have carried it away that all the nation might worship at Jerusalem.

Ta′bor, a celebrated mountain of northern Palestine, rising from the plain of Esdraelon to a height of 1,000 feet, commands the widest and finest view in Palestine. It is thickly clad with forests of oak and other trees. It was renowned from early times as the place of Christ's transfiguration, though it is now believed that at one time a city stood on its summit. In the times of the crusades Tabor was studded with churches and monasteries. Here Deborah and Barak summoned the warriors of Israel before the battle with Sisera; 10,000 Jews were slain near by in a battle against the Romans in 55 B. C.; and at its foot Napoleon gained a great victory over the Turks.

Tabriz (*tȧ-brēz′*), an old city of Persia, on Aji River, 40 miles from Lake Urumiah. A ditch and a brick-wall with seven gates surround the city. Water, a rare thing in the east, is plentiful. The fine ruin of the Blue Mosque is covered in part with arabesqued, blue tiles. The citadel is a brick-building, whose walls have been cracked by earthquakes. The chief manufactures are leather, silk and gold- and silver-smithing. Tabriz is on a caravan-route, and is a city of business importance, doing a large trade with Russia. Tabriz, the ancient Tauris, became the capital of Armenia in 297 A. D. Zobeida, the wife of Haroun-al-Raschid, greatly enlarged it. It was sacked by Timur in 1392, and after being held by the Turkomans was taken by the Persians in 1500. The place has often been damaged by earthquakes, that of 1721 causing, it is said, the death of 80,000 persons. Population 200,000. See Eastwick's *Three Years in Persia*.

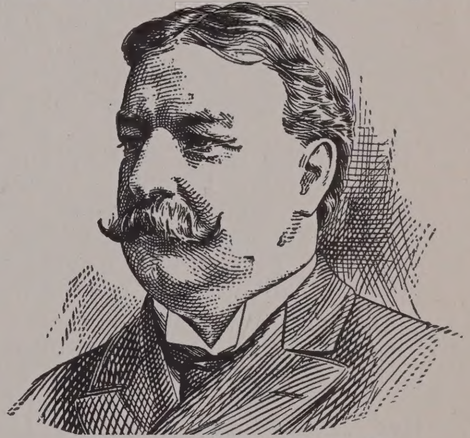
Tacitus (*tăs′ĭ-tŭs*), **Publius Cornelius,** a Roman historian, was born probably about 55 A. D. He enjoyed the favor of Emperors Vespasian, Titus and Domitian, and married a daughter of Agricola (*q. v.*). He held several public offices, became known as an orator, and was a close friend of the younger Pliny, through the appointment of the two to carry on the prosecution of Marius. Eleven of his letters are addressed to Pliny. Tacitus probably lived for a time after Hadrian came to the throne. His *Life of Agricola* (A. D. 98) is one of the finest biographies ever written. His other works are *Histories* (104–110), *Annals*, *Germany* (98), and his *Dialogue on Orators* (A. D. 79), the first and least valuable of his writings. These histories rank among trusted sources of knowledge of the times of which they treat, and have given their author high rank among the world's historians. But Tacitus is not one of the authors in whom our confidence is increased by rereading.

His account of Tiberius is manifestly unjust, being steeped in the prejudices of the Roman aristocracy and drawn from a poisoned source. He died, it is thought, in 120 A. D.

Tacoma (*tȧ-kō'mȧ*), **Wash.,** county-seat of Pierce County, is on Puget Sound at the head of navigation. The sound, which is from three to five miles wide, narrows near Tacoma to an inlet known as Commencement Bay, less than a mile wide but five long. The city is built on a bluff 200 feet high, overlooking the sound and the Cascade range, with the snowy peaks of Mt. Rainer, also known as Mt. Tacoma, in the distance. The city was laid out by the Tacoma Land Company, an organization by the managers of the Northern Pacific Railroad, which in 1873 bought 16,000 acres near the little village of Rainier, that consisted of one sawmill and the houses of its workmen. They made it the terminus of their road and built two hotels, the second costing $750,000. The salmon-fisheries of Puget Sound, the hop-fields in Puyallup Valley, the great forests of white pine and cedar on the neighboring mountains and the coal, iron and other minerals of the region furnish the materials of the large trade of the city. Regular transport-service has been established between Tacoma and London, trains laden with hops meeting the steamers at New York, and its harbor is a starting-point of steamers for Alaska. The works of the Tacoma Lumber Company cover 80 acres in the city, and it owns 150,000 acres of timber-land and 5,000 of coal-land. More than 40 establishments are engaged in the manufacture of lumber and other products of wood-working factories. The lumber and other products are loaded at the wharves for China, Japan and Australia. There also are large smelting-works and wheat elevators, rolling-mills, car-shops, flour-mills, iron-foundries, smelters, a large private dry-dock, meat-packing establishments and the most extensive fisheries-plant in the United States. Tacoma has ten banks and one foreign branch-bank (London). The public-school system includes a high school, with manual-training department and grade-schools, numbering 29, while the cost of maintaining the schools is $245,000 annually. Tacoma also is the seat of Puget Sound University (M. E.), Washington College, Annie Wright Seminary (Episcopal), Academy of the Visitation (R. C.), the Y. M. C. A's. evening-institute and other institutions. There are fine public buildings, a free library and an ethnological and historical museum. The Great Northern, Northern Pacific and Tacoma Eastern railways serve the city. The following roads are building into it: The Union Pacific, Southern Pacific. Chicago, Milwaukee and St. Paul, Canadian Pacific, Chicago and Northwestern, North Coast, Portland and Seattle and Port Townsend Southern. Population (1910), 83,743; now 108,094.

Taft, Lora'do, American sculptor, was born at Elmwood, Ill., April 29, 1860, and graduated at the University of Illinois and at *École des Beaux Arts*, Paris. In 1886 he settled in Chicago, and became instructor in its Art Institute and lecturer on art at the University-Extension-Department of the University of Chicago. He has produced many busts and ideal subjects, and among other fine decorative work of his was that of the horticultural building of the Columbian exposition. The symbolic beauty and fine workmanship of these decorations won great praise. Among his many works are a bust of Schuyler Colfax in Indianapolis, a statue of General Grant and the fine reliefs for the Michigan regimental monuments on the field of Gettysburg. Mr. Taft is a member of the American Sculpture Society and of the Western Society of Artists.

Taft, William Howard, twenty-sixth president of the United States, was born in Cincinnati, Ohio, September 15, 1857, where in 1880, after graduating with honors from Yale, he began practicing law and became, successively, prosecuting attorney for the county, a judge in the Superior Court, solicitor general of the United States, and from 1892 to 1900 judge of the Federal circuit court, receiving the L.L.D. degree from Yale and becoming dean of the Cincinnati Law School. In 1900 he was made President of the Commission to set up Civil Government in the Philippines. Made Civil Governor in 1901, he rendered distinguished service by establishing a governmental system and settling the friar land problem. Appointed Secretary of War in 1904, he showed equal zeal and ability in promoting the construction of the Panama Canal and aiding in the reconstruction of Cuba. In 1908 he was nominated by the Republicans and elected President by enormous pluralities. Among the most important events of his administration were the passage of the Payne-Aldrich tariff, the acts establishing Postal Savings Banks and the Parcel Post systems, the


WILLIAM HOWARD TAFT

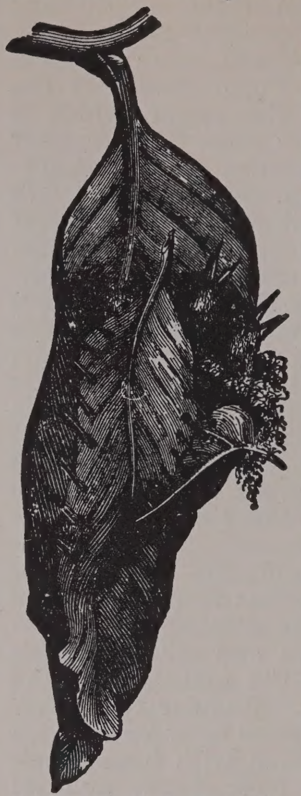
Canadian reciprocity agreement, and the signing of general arbitration treaties with France and Great Britain. The reciprocity agreement was rejected by the Canadian parliament and the senate failed to ratify the arbitration treaties. The Payne-Aldrich act was severely criticized as a violation of the promise of the platform to reduce the tariff. President Taft was also charged with being hostile to the conservation movement, in connection with which he removed from office Chief Forester Pinchot. Owing to dissatisfaction with Mr. Taft's course, particuularly on the tariff and conservation, his party was sharply divided, and after his renomination, the progressive wing of the party held a convention of its own, organized the national Progressive party, and nominated Theodore Roosevelt. Following the election of Wilson, the Democratic candidate, Mr. Taft was professor of law at Yale until June, 1921, when President Harding appointed him chief justice of the United States Supreme Court.

Taganrog (*tȧ-gȧn-rôk′*), a seaport of southern Russia, stands on the northern shore of the Sea of Azov. It was founded by Peter the Great in 1696. The shallow harbor forces ships to unload into barges half a mile from the quay. Wheat is the chief export, but linseed, skins and wool are also sent out. The place is strongly fortified and is the main port of the Sea of Azov. Alexander I built a beautiful palace and has a monument here. Other buildings are the admiralty, cathedral and marine hospital. French and English gunboats damaged Taganrog by bombardment in 1855. Population 58,928.

Taglioni (*tȧl-yō′nē*), **Maria**, perhaps the world's greatest dancer, was born at Stockholm, Sweden, on March 18 or April 23, 1804. Her father was a noted Italian ballet-master, and under his guidance she first danced at Vienna in 1822. Five years later Paris went wild over the accomplished ballet-girl. She married Count Gilbert de Voisin in 1847, and left the stage. She died on April 23, 1884.

Ta′gus, the largest river of the Spanish peninsula, rises on the frontier of New Castile and Aragon, flows through Spanish and Portuguese territory, and, after 540 miles, falls into the Atlantic by an inlet at some places five miles broad. Near its source, and also near Toledo, the river runs between rock-walls several hundred feet high. The navigable part of the river, 115 miles, is wholly within Portugal. Lisbon and Toledo are on the Tagus.

Tai′lor-Bird, a small bird about the size of a warbler, living in India, Ceylon and southern China. There are about seven species. The common tailor-bird is olive-green above and yellowish white underneath, with a pale, brick-red crown. In making its nest, leaves at the end of a twig are sewed together, or sometimes the edges of one large leaf are united. The bill is used as a needle, and fibers and grass are used as threads. This habit gives its name of tailor-bird. The united leaves do not form the nest, but merely are a receptacle for it. The nest proper is made of wool and vegetable-fibers and is lined with hair.



NEST OF THE TAILOR-BIRD

Taine, Hippolyte Adolphe, a well-known French critic, was born at Vouziers, France, April 21, 1828. He studied at Bourbon College, and in 1864 was made professor of the history and æsthetics of art in the school of arts. One of his first essays was crowned by the French Academy. Among his most important works is *The History of English Literature*, a clear and valuable criticism written in brilliant style. In 1871 the University of Oxford conferred the honorary LL.D., and in 1887 he was elected to membership in the French Academy. His other writings embrace *Journey in Italy*, *Journey to the Pyrenees*, *The Old Régime*, *Notes on England* and *The Ideal in Art*. He died at Paris, March 5, 1893.

Tai-Pings, the name given to the Chinese rebels who rose in 1850 and laid waste some of the best provinces of China. The capture of Pekin by French and English troops in 1860, followed by a treaty giving foreign merchants valuable privileges, made it to the interest of the American, French and English governments to re-establish order in China. Ward, an American citizen, who had taken service under the Chinese emperor, showed a remarkable talent for disciplining irregular troops, and was the chief means of the success of the imperial forces in defeating the rebels at Shanghai in 1860 and 1862. In this year Ward was killed, and "Chinese" Gordon was placed in command of his force, which became famous as Gordon's brigade. The Tai-Pings were defeated in over 16 engagements, and in 1864 almost every important city held by them was captured. The rebellion, however, was not stamped out until 1867. See CHINESE EMPIRE.

Tait, Peter Guthrie, an eminent Scotch physicist, was born at Dalkeith, April 28, 1831. He was educated at Edinburgh Academy and University and, later, at St.

Peter's College, Cambridge, England, where he graduated as senior wrangler and first Smith-prizeman. In 1852 he was appointed a fellow of Peterhouse; and in 1854 professor of mathematics in Queen's College, Belfast; but after 1860 he was professor of natural philosophy in Edinburgh. Few men ever exercised more thoroughly healthful influence on the teaching of physics than did Tait. At the same time he set a wholesome example to students and instructors by a very important series of contributions to knowledge. As evidence of this, witness the two quarto volumes of his *Scientific Papers* published by the Cambridge Press. Among his other important publications may be mentioned *Dynamics of a Particle; Quaternions; Recent Advances in Physical Science;* Thomson and Tait's *Natural Philosophy;* and text-books covering his university lectures. He died at Edinburgh on July 4, 1901.

Taj-Mahal (*täzh-ma-häl'*), a costly tomb built in Agra, India, by Jehan, the Mogul emperor as a burial-place for Noor Mahal, his favorite wife. It is said to have cost $4,000,000, and building it employed 20,000 workmen for 22 years. Facing Jumna River, where tall cypresses lead to a splendid park in the background, rises the loveliest monument of man's skill combined with nature's material. It is of white marble, 100 feet long and wide and 200 high. It is an eight-sided palace resting on a marble terrace, which is supported by a terrace of red sandstone. A dome flanked by cupolas surmounts the building and minarets rise from the four corners of the marble terrace. Inside and outside are mosaics of precious stones and beautiful tracery. The whole Koran is written in precious stones on the walls This tomb of tombs has been described by travelers as a "glimpse of Paradise." The Taj-Mahal, where Shah Jehan's own remains also rest, appears more like a palace of the frost-king than a building of alabaster and marble. In the sunlight the great dome seems to float above it like a silken balloon, and the minarets resemble exquisite ivory carvings of feathery lightness. Within, beneath the dome, is a tall circular screen of marble lace, 60 feet around, which encloses the tombs covered with carved inscriptions thickly jeweled. The only light which reaches this heart of the Taj is filtered through the delicate meshes of the screen. A well-known writer says concerning the echo: "The dome receives all sounds within its silvery crucible, transforms them into purest harmony, and then sends them down again as if the upper space were tenanted by a celestial choir chanting an endless requiem."

Yet this marvelous mausoleum is but one among many specimens of Mogul art. The Mogul empire in India existed between 1526 and 1857, when the fashion of extravagant architecture reached its height. Among the great Moguls one should remember Babar the founder; Akbar (*q. v.*) the ruler; and Jehan (*q. v.*) the master-builder. So large were the stones of the splendid structures in comparison with the small and delicate patterns carved upon them, that the world declares that these people "built like giants and finished like jewelers." Among their other works are a mosque at Futtehpore Sikri and a tomb at Secundra by Akbar; the Pearl Mosque; and the Palace at Delhi built by Jehan. The Moguls borrowed characteristics or marks in construction from their Persian and Arabic neighbors. Some of these are the bulbous or turnip-shaped domes grouped about a central, large dome of the same shape; the curving, pointed arch called an ogee; and arabesque as well as floral patterns in their carving. The high portals to the buildings curve inwards, forming an inside porch with three doors elaborately carved to match the rows of pillars, pointed arches and windows. Slender towers called minarets connect the buildings with balustrades, and are charming view-points from which one may look down upon the courts where flowers bloom and fountains play, thus repeating the beauty of the gardens. The stone or brick walls are faced inside and out, usually by marble slabs; and are often inlaid with onyx, jasper, carnelian and other semi-precious stones, which are cemented into cuttings in the marble and in wonderful patterns of vines and flowers. The love of gems for decoration was shown in the making of Jehan's famous peacock-throne, now in Persia. The back of the seat is two golden peacocks set with rubies, sapphires, emeralds and diamonds, with a pearl-fringed canopy above. This was placed in a private audience-hall overhanging the sea. On the walls of the gorgeous room were these words: "If there be a paradise on earth, it is this." Consult Fergusson's *History of Indian Architecture*, Gordon Hearn's *Seven Cities;* Sir E. Arnold's *India Revisited;* and the models in the London Museum of Indian Curiosities. See ARCHITECTURE, FINE ARTS and MONGOLS.

Talc (*tălk*), a mineral consisting of magnesium silicate containing a little water, much like mica in appearance and easily divided into thin flakes, which can be bent and are transparent but are not elastic like mica-flakes. It, however, is much softer than mica, can be readily scratched by the finger-nail, and feels greasy when rubbed with the fingers. It is silvery white, greenish white, or green with a pearly luster. It is found in crystalline and in masses. The massive varieties cannot always be separated into flakes. Massive talc, called soapstone, steatite, potstone and French chalk, is quarried in large quantities in Vermont, New Hampshire, Massachusetts, Maryland.

Virginia and North Carolina, and in smaller quantities in other states. Soapstone in slabs is largely used for wash-tubs and for tables in chemical laboratories. It does not crack when exposed to moderate heat, as slate usually does.

Tal′ent, anciently a weight and a denomination of money, varying at different periods and among different nations, as the Greeks, Babylonians and Phœnicians. The Greek talent of weight contained 60 *minæ* or about 80 pounds avoirdupois; the monetary talent among the Greeks was a talent's weight of silver or gold — the monetary unit. The Attic talent of silver, which weighed about 58 pounds avoirdupois, was of the value of about $1,200. Among the Hebrews a talent of silver was equivalent to 3,000 shekels (about $1,700 or $1,800); the gold talent was equal to 10,000 gold shekels — the value being determined by the current price or purchasing power of the metal of which it was weighed, whether of silver or of gold.

Tal′isman, The, a novel by Scott, was published with *The Betrothed* in June of 1825, and written in the true spirit of old romance. Most of its incidents are fictitious, though the ideals of the crusading times are made to live again. The spirit of the Holy Land vies with that of the Scottish border. The action takes place in Palestine, the title being derived from an amulet or charmed stone with which Saladin cures King Richard Cœur de Leon in his illness. This he afterwards presents to Sir Kenneth, the hero. finally discovered to be the prince royal of Scotland on his marriage with Edith the sister of Richard. *The Talisman* has always been a favorite with the young, It glows with bright impossibilities, even to a fault.

Tal′lade′ga, Ala., county-seat of Talladega County, on the Southern, the Louisville and Nashville and the Atlanta, Birmingham & Atlantic railroads, 50 miles southeast of Birmingham. Here in 1813 was fought a battle between the Creek Indians and an American force under Andrew Jackson. The city is the seat of Talladega College (Cong.) for colored students, of the Orphan's Home (Presb.), and of state schools for the deaf, dumb and blind. Its industries embrace the manufacture of cotton, knitted goods, chemicals, fertilizers, cottonseed-oil, furniture, cordage, oil, ice brick and marble products. Population, 5,824.

Tallahassee (*tăl lȧ-hăs′sē*), **Fla.,** the capital of the state and county-seat of Leon County, stands on high ground, 21 miles north of the Gulf of Mexico. The capitol was begun in 1826. There are railroad-car and machine shops, a cotton-factory, novelty works and cigar-factories. The leading educational institutions located here are Florida State College for women, which has a normal department and a fine public-school system. The old Spanish fort of San Louis is near by, and 16 miles away is the well-known and beautiful spring Wakulla. The town is noted for its flowers. Tallahassee was made the territorial capital in 1822, but was not laid out until 1824. Population, 5,018.

Talleyrand (*tăl′lĭ-rănd*) **de Perigord, Charles Maurice,** Prince, a famous French diplomatist, was born at Paris, Feb. 14, 1754. His father, Count of Talleyrand, would have had him enter the army, had he not been accidentally lamed when a child. So he became a priest and rose to be bishop of Autun. As a member of the national assembly of 1789 he was a hearty friend of Mirabeau, and at the feast of the federation in the next year he headed a procession of 200 priests wearing the national colors over their white robes and performed mass on the altar set up in *Champ de Mars.* After the fall of Louis XVI Talleyrand went to England and then to the United States, where he reaped a fortune by speculation. He went back to France as soon as his name was crossed off the list of exiles, and in 1797, as the newly appointed minister of foreign affairs, welcomed Napoleon on his return from his famous Italian campaign. He greatly helped Napoleon to seize absolute power, and as his minister of foreign affairs became the ablest diplomat in Europe. An estrangement, however, separated the co-workers, Talleyrand resigning in 1807. To his intrigues was chiefly due Napoleon's fall in 1814, and for this treachery he was for the third time made foreign minister by Louis XVIII. At Napoleon's return from Elba he was in Austria as French commissioner to the Congress of Vienna, but after Waterloo he accompanied the king to Paris. He soon resigned his office, but retained great influence, men of all parties thronging his salon. He came to the front again after the revolution of 1830, as ambassador to England. His personal *Memoirs* and his *Memoir on the Commercial Relations of the United States* are the most valuable of his writings. He died on May 20, 1838.

Tallien (*tä-lyăn′*), **Jean Lambert,** a French revolutionist, was born at Paris in 1769. He first came to the front in 1792 as editor of a Jacobin newspaper, which gave him great influence. As secretary of the commune he helped on the September massacres. He was a supporter of Marat, and was eager for the death of Louis XVI and the Girondists. In 1793 he was sent to Bordeaux to root out this party, where he gained lasting infamy by his reckless cruelty. In 1794 he came back to Paris to become president of the Convention; and, to save himself from the attacks of Robespierre, he organized the destruction of the Terrorists, though he had himself perhaps been more guilty than they. Tallien now became one of the most influential men, but his past crimes could not be forgiven and in 1798 he was forced to leave the council of 500. He died on Nov. 16, 1820.

Talmage (*tăl'măj*), **Thomas De Witt,** American Presbyterian clergyman and lecturer, was born at Bound Brook, N. J., Jan. 7, 1832; was educated at the University of the City of New York; and graduated from the Theological Seminary of New Brunswick, N. J. He was pastor successively of Reformed Dutch churches at Belleville (N. J.), Syracuse (N. Y.) and Philadelphia (Pa.), and from 1869 to 1874 he was in charge of Central Presbyterian Church at Brooklyn, N. Y. In 1895 he accepted a call to First Presbyterian Church, Washington, D. C. He edited *The Christian Herald*, and was also editorially connected with *The Christian at Work*, *The Advance* and Frank Leslie's *Sunday Magazine*. Besides many volumes of lectures and sermons he published *Around the Tea-Table*, *The Marriage-Ring*, *Old Wells Dug Out*, *The Pathway of Life*, *Everyday Religion*, *From Manager to Throne*, *Woman* and *Sundown*. He died on Apr. 12, 1902.

Tal'mud. See LITERATURE, JEWISH.

Tam'arack. See LARCH.

Tam'arind, a tree cultivated in India for its fine shade as well as for its fruit. It also is grown (though of the wild type) in other tropical countries, as Florida and the West Indies. It is known as the Indian date, its long, many-seeded pods containing an acid pulp, which is used medicinally and as a pleasant drink, and also as an ingredient in curries and in making sherbet. The tree has a hard wood, of value in cabinet-work, and is exceedingly handsome.

Tambourine (*tam-bŏŏr-ēn'*), a very old musical instrument, used by Basques, Italians and Gypsies. It is a piece of parchment stretched on a hoop furnished with little bells, and is sounded by the hand, fingers or elbow. It is used to accompany singing and dancing, and has been adopted by the Salvation Army.

Tam'erlane. See TIMUR.

Tam'many Society, the most powerful political club in the world, is an organization of the Democratic party in New York City, and was founded in 1789. It was nearly ruined at the time when the city and it were under control of the Tweed ring. It has been more or less opposed by outside Democrats in New York at various times, but is still a very powerful factor in political affairs. See TWEED.

Tam'pa Bay, an inlet of the Gulf of Mexico on the western coast of Florida, south of Cedar Keys and north of Charlotte Harbor, on which the city of Tampa is situated. The bay, known also by its old Spanish name of Espiritu Santo, is divided in its upper waters by a peninsula into Old Tampa Bay and Hillsboro Bay. Its length is between 35 and 40 miles, while in breadth it varies from six to 14, with a depth of 22 feet at its main entrance, which is protected from the Gulf by a number of keys or low islets.

Tampa, Fla., a thriving city and port of entry at the head of Tampa Bay and the mouth of Hillsboro River, the capital of Hillsboro County, 30 miles from the Gulf of Mexico, in western central Florida. It has a spacious harbor, and steamship connections through four companies to many ports. It is on an airline. It has railway connection with the Florida Central and Vennisula, the Savannah, Florida and Western and other railroads. Its chief industry is the manufacture of cigars; fruit-culture, the fishing-trade and the shipment of phosphate are other occupations of its people. Population, 110,000.

Tampico (*tȧm-pē'kō*), a Mexican seaport in the State of Tamaulipas, on the Panuco, five miles from the Gulf of Mexico and 235 miles northwest of Vera Cruz, Its harbor has a dangerous bar, and is unsafe. Trade is carried on chiefly with New York, New Orleans and Liverpool. Population 12,000.

Tanager (*tăn'ȧ-jẽr*), the name for members of a large family of birds mainly confined to tropical America. There are about 350 species. Two forms abound in the eastern and southern United States. The scarlet tanager is our most brilliantly colored bird, and is familiar to most people who live within its range. It is a little more than seven inches long; the male, during the breeding period, is bright red with black wings and tail; the female is clear olive-green above and greenish yellow below. After the nesting-period the male becomes colored like the female. They inhabit both high and low woods and usually nest in oaks. Our other tanager is the summer redbird, a more southern species, which ranges north to New Jersey and southern Illinois. The male is bright rose-red throughout, with the wings a little dusky. The female is dull olive above and yellow below.

Tananarivo (*tȧ-nä'nȧ-rē-vō'*) or **Antananarivo,** the capital of Madagascar (*q. v.*), is built on a long hill 7,000 feet above the sea. The houses are of wood or bamboo, roofed with bamboo or mats. The habits and ways of the people have been greatly bettered under the teaching of missionaries. Population 65,000.

Tancred (*tăn'krĕd*), an Italian prince, was born in 1078. He joined the crusaders under Bohemond, his cousin, the son of Robert Guiscard, the crusader. He fought bravely at the siege of Nicæa in 1097. and in the battle of Dorylæum saved the Christian army from being cut to pieces. In the massacre which followed the capture of Jerusalem, whose walls he was one of the first to mount, he alone had any mercy for the conquered, in whose behalf he risked his own life. Tancred defeated the advance guard of the sultan of Egypt, and had a great share in the capture of Ascalon. After taking Tiberias he was made prince of the city. He defended Antioch against great odds, whose governor (his cousin Bohemond) had left to raise recruits in the west. Tancred carried his arms as far as Tripoli, and succeeded in driving the Saracens out of Syria. He died at Antioch in 1112. He is one of the leading heroes of Tasso's famous poem of *Jerusalem Delivered.*

Taney (*ta'nĭ*), **Roger Brooke,** chief-justice of the United States, was born in Calvert County, Md., March 17, 1777. He graduated at Dickinson College, Pennsylvania, studied law, and took part in politics as a Federalist. He afterwards became a Jackson Democrat, and was made attorney-general in President Jackson's cabinet in 1831. Two years later he was appointed secretary of the treasury, as his chief knew that he could be depended upon to remove the government deposits from the United States Bank to local banks, the refusal to do which had caused the dismissal of Secretary Duane. Taney succeeded the great Marshall as chief-justice of the supreme court in 1837. His most famous decision was that in the Dred-Scott case in 1857, in which Scott, a negro, brought suit to gain his freedom on the ground of his having been carried by his master from the slave-state of Missouri into free territory. The decision, denying the right of citizenship to negroes and the authority of Congress to keep slavery out of the territories, caused greater excitement throughout the country than any decision of the supreme court before or since. Chief-Justice Taney died at Washington, D. C., Oct. 12, 1864. See *Life* by Prof. Samuel Tyler.

Tanganyika (*tăn-găn-yē'kä*), meaning the meeting place of waters, is the name of a great Central African lake discovered by Burton and Speke in 1858. It lies south of Lakes Albert Edward and Albert and northwest of Lake Nyasa; is about 400 miles long and from 10 to 60 wide; and is about 2,700 feet above the ocean. A wide bay at the southern end was named Lake Liemba by Livingstone. The eastern coast is hilly, and the western coast mountainous and covered with forests. There are many small rivers flowing into it, and the Lukuga flows from it into the Kongo. Ujiji, where Stanley found Livingstone, is the principal town on the lake. Telegraph lines now run through the Nyasan protectorate to Tanganyika.

Tangier (*tȧn-jēr'*), a seaport of Morocco near the western entrance of the Strait of Gibraltar, is built on high ground and is defended by forts. It is the principal center of commerce in Morocco, has important trade with Europe, doing a foreign business of $4,000,000 yearly, and is the residence of consuls and the diplomatic corps sent to Morocco. Tangier, once called *Tangis,* is an old city, and is thought to have been founded by the Carthaginians. It became the capital of a Roman province, was held by the Portuguese for nearly two centuries, and in 1662 was presented to Charles II of England as part of the dowry of Catherine of Braganza. England held it for 22 years. In 1844 it was bombarded by the French. Population about 35,000.

Tanjore (*tăn-jōr'*), an Indian city, 180 miles southwest of Madras. There are two strong forts; in the larger one is the rajah's palace, in the smaller, one of the finest of Indian pagodas. Silk, muslin and cotton cloths are manufactured. Tanjore was first the capital of a Hindu state of the same name, which was conquered by the Mahrattas, and fell into the hands of the British about 1800. Population 57,870.

Tannhäuser (*tăn'hoi-zẽr*), a famous knight of the middle ages, who, according to the German legend, goes to Venusberg and enters the cave-palace to behold the wonders of Lady Venus and her court. Conscience-smitten at the life of careless pleasure he lives here, he betakes himself to Rome to crave forgiveness of the pope. The pope, however, holding a wand in his hand tells Tannhäuser that he can as little get God's forgiveness as that dry wand can become green again. In despair the knight goes back to Lady Venus in the mountain. But three days afterwards the wand begins to sprout and bears green leaves, and the pope at once sends messengers to every country, but in vain — Tannhäuser can nowhere be found. Such is the story as told in the popular ballad once sung all over Germany. On this *saga* Wagner based his well-known opera of *Tannhäuser.*

Tannhäuser and the Singers' Contest at the Wartburg is the title of a music drama by Richard Wagner, who wrote both words and music. First performed at Dresden, Oct. 20, 1845. The conception of the opera occurred during a visit of Wagner to the castle of Wartburg, in the Thuringian Valley, in the spring of 1842. The castle was the traditional scene of the contests between the *minnesinger* and the knightly poets, whom the landgraves of the 13th century assembled for tournaments of song. Schumann mentions the opera as one "which cannot be spoken of briefly," adding that "it certainly has an appearance of genius."

Tan'nin or **Tan'nic Ac'id** is of great importance in tanning leather. The chief source of tannin is oak-bark, though in America hemlock-bark is much used, while the mimosa or wattle-barks of Australia are important. However, tannin is found in the bark and leaves of most forest-trees, as the elm, willow, horse-chestnut, and pine, and in many fruit-trees as the pear and plum. Coffee, tea and, especially, Paraguay tea also contain tannin.

Tan'ning. See Leather.

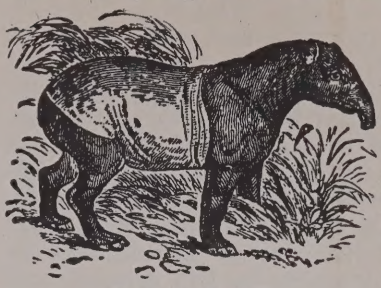
Tantalus (*tăn'tȧ-lŭs*), noted in Greek myth for the punishment he received in the lower world. He was the son of Zeus, and for making known the counsels of his divine father or for other reasons, — the stories differ, — he was in the lower world stricken with a fearful thirst, and had to stand up to the chin in a lake, the waters of which escaped him whenever he tried to drink. Clusters of fruit hung over his head, but missed his grasp whenever he reached for them; at the same time he was in terror lest a huge rock, hung over his head and ever threatening to fall should crush him. From Tantalus comes "tantalize."

Tapajos (*tä'pȧ-zhŏsh'*), an important river of Brazil and a branch of the Amazon, is formed by the junction of the Arinos and the Juruena. After flowing north for over 1,100 miles, the Tapajos falls into the Amazon 20 miles below the town of Santarem. Its upper waters are only 18 miles from those of the Paraguay. There is one fall of 30 feet, but otherwise the river is navigable for the greater part of its length.

Tap'estry, an ornamental figured cloth, used for lining walls and covering furniture. The Jews and Egyptians were skillful tapestry workers. In France the ladies of the nobility used their needles in making beautiful tapestry for the adornment of churches and monasteries. About the 9th century this work began to be done by the loom. The Flemings excelled in tapestry-weaving, and in the 14th and 15th centuries the factories of Brussels, Bruges, Antwerp, Lille and Valenciennes were noted, and in the next century the factory at Fontainebleau. The art of weaving tapestry was introduced into England near the end of the reign of Henry VIII. A famous and very old factory is that of the Gobelins at Paris. So slow is the work that 39 square inches are considered a fair year's work for one artist. Perhaps the most remarkable piece made by hand is the Bayeux tapestry (*q. v.*), which commemorates the Norman Conquest. It is 214 feet long, and is of great historical value, as it shows the old Norman costumes in great detail, and also pictures events of the conquest not mentioned by any chronicler.

Tap'io'ca, a farinaceous substance prepared from cassava-meal, which, while moist or damp, has been heated for the purpose of drying it on hot plates. By this treatment the starch-grains swell, many of them burst, and the whole agglomerates in small, irregular masses or lumps. In boiling water it swells and forms a viscous jelly-like mass.

Ta'pir, the name for several thick-skinned mammals with elongated snouts, inhabiting India, the adjacent Malayan islands and Central and South America. The tapirs, united with the rhinoceroses and horses, form a group of odd-toed ungulates or hoofed animals, all other hoofed animals having an even number of toes. The tapirs have three toes behind and four on the front feet, but only three are used. The Old-World tapirs are larger than those of the New World, the common Indian form being eight feet long and thirty-nine inches high at the shoulders. The legs and the front part of the body are black, but the sides and back of the hinder portion are white. Those of the New World are brown or blackish when adult. The common South-American form is about seven feet long, and inhabits thickly wooded districts as far as the Andes. It is there replaced by a mountain form living at altitudes of 7,000 and 8,000 feet. There are two species in Central America whose habits are little known. Tapirs commonly feed on young leaves, shoots and fruits. Those of South America are destructive to plantations. They are hunted for their flesh and hides.



MALAY TAPIR

Tar, an impure turpentine got by burning the wood of pine and cone-bearing trees and by distilling peat, bituminous coal and shale. The early Greeks made tar and the people living along the Gulf of Bothnia now make it in the same way, by burning wood in a heap covered with turf, much as charcoal is made. In Sweden trees are partly stripped of their bark, and, when cut down some six years later, are found much richer in resinous matter. In the United States most wood-tar comes from North Carolina, though it is also made in other parts of the country. It is usually made of pitch-pine, and is burned in tar-kilns, which are piles of pine-billets in the form of an inverted cone, covered with logs, green twigs and earth. The kiln is lighted at the top, and the tar runs out through a wooden spout at the bottom.

Coal-tar is made when illuminating gas is manufactured from bituminous coal. For a long time this tar was a mere waste-product, but now it is widely used as a covering to protect iron-work from the weather; and the pitch is used for pavements, roof-covering etc. By distilling coal-tar, benzine or benzol and other volatile products are obtained, which are very valuable as raw materials in the preparation of artificial dyes.

Tarantula (*tȧ-răn'tū-lȧ*), the name commonly applied to any large, running spider of warm countries. The true tarantula is a native of southern Europe, and got its name from being common in the neighborhood of Taranto, Italy. The bite was considered very dangerous, and was fabled to produce an epilepsy which could be cured only by dancing, until exhausted, to lively music of a particular kind. The tarantulas, using the name in its wide meaning, are dark-colored, hairy spiders, with mandibles that work up and down, instead of sideways, as is the direction in most other spiders. They live under rocks and in holes which they make in the ground and line with silk. They do not spin webs, but rush upon passing insects and other prey.

Tar′bell, Ida Minerva. A noted American writer upon historical and economic subjects. Born in Erie County, Pennsylvania, on Nov. 5, 1857, she grew up in the oil-region. She graduated with honors from Titusville High School and Allegheny College, and studied in Paris, 1891–4, at the Sorbonne and the College of France where she began to make her mark as an historical writer. She for eight years was associate-editor of *The Chautauquan*, later was on the editorial staff of *McClure's Magazine*, and is now associate editor of the *American Magazine.* Among her writings are *Short Life of Napoleon Bonaparte; Life of Madam Roland; Life of Abraham Lincoln;* and *History of the Standard Oil Company.* She has written extensively for magazines.

Tarifa (*tȧ-rē′fȧ*), a famous Spanish city, is 25 miles southeast of Cape Trafalgar. It has old walls, towers, a fortress and a Moorish castle. Tarifa was founded by the Moors, who forced all vessels passing through the Strait of Gibraltar to pay tribute at this town. From this fact comes our word "tariff." The Castilians captured Tarifa in 1292 and held it in the face of several sieges by the Moors. The French besieged it in vain in 1811, but captured it in 1823. Population 11,725.

Tar′iff. A tax on imports. The following summary of United States tariff legislation gives the date, purpose and character of each measure and the name by which it is known:

1789. Hamilton (*q. v.*). Object, to put money into country's empty treasury. Articles listed 51; duties 5 to 15%; amended six times (1789-1804).

1812. Lowndes-Calhoun. First to protect as well as raise revenue. Many manufactures had sprung up during the war. Duties 7½ to 33% ad valorem.

1824. Clay (*q. v.*) and "Tariff of Abominations" (1828), both of which further raised duties. Average of latter 37%.

1832. The "Modifying" tariff. Endeavored to readjust duties more equally.

1833. "Compromise" tariff. Reduced duties ⅓ yearly down to uniform rate of 20%.

1842: Polk-Walker. For revenue only. Duties reduced by 1857 to average of 15.66%.

1861. Morrill, Protective. Doubled existing duties.

1890. McKinley. Increased duties 60% but enlarged free list and empowered president to remove from free list certain products of any country charging unreasonable duties on U. S. products. (Reciprocity clause.)

1894. Wilson. Removed duties on raw materials, lowered duties generally and provided for income tax (*q. v.*). Latter declared unconstitutional.

1896. Dingley. Rates somewhat lower than McKinley.

1910. Payne-Aldrich. Made some reductions but Democrats won on platform condemning the act as failing to fulfill Republican promise of reduction. (See Taft.)

The Tariff of 1913.

The tariff of 1913 made 938 reductions of duty, 86 increases and left 307 rates unchanged. Reductions and removals of duty affect raw material, machinery and manufactured goods including cotton, woolen, linen and silk, sugar and other food stuffs. The average rate on cotton goods was cut from over 45% to about 30%. The duty on wool was removed and on woolen cloth fixed at the uniform rate of 35% ad valorem as against 90 to 152%; on clothing at 35% as compared with 75%. Comparative rates (ad valorem) on woolen products are as follows: 35-90 to 152; clothing 35-75; flannels 25 to 30-75 to 110; blankets, 25-68 to 200%. Agricultural products 15-29, and all food animals are admitted free. Free admission of sugar after May 1, 1916; immediate free admission from the Philippine Islands and reduction of about one-fourth after March, 1914. Leather and tanning extracts are admitted free; also agricultural machinery and implements of every kind. Wood and woodenware and furniture reductions, all the way from 25 to 60%. Original works of art on free list. The increase affects mostly articles of luxury.

Tark′ington, Newton Booth, American novelist, was born at Indianapolis, Ind., on July 29, 1869, and graduated at Princeton in 1893. When, later, pursuing a business career, he discovered gifts in himself as a writer, especially of realistic and romantic stories. His first notable work, *The Gentleman from Indiana*, met with instant success, and was followed in 1900 by *Monsieur Beaucaire*, a novelette subsequently dramatized and produced on the stage by Richard Mansfield. In 1902 appeared *The Two Vanrevels*, in 1903 *Cherry*, in 1905 *The Conquest of Canaan* and *The Beautiful Lady*, besides *In the Arena: Tales of Political Life.* In 1902 he entered practical politics as a member of the Indiana legislature.

Tarpeian Rock (*tär-pē′yan*), at first the name given to the whole Capitoline Hill in Rome, but afterwards only to the southern part of it. Tarpeia, daughter of the governor of the Roman citadel on the Capitoline, covetous of the golden bracelets worn by the Sabine soldiers and tempted by their offer to give her what they wore on their left arms, opened the gate of the fortress to the Sabine king. Keeping their promise to the letter, the soldiers crushed Tarpeia to death beneath their shields, which were carried on the left arm, and she was buried on the part of the hill which bears her name. Afterwards traitors were often hurled from the Tarpeian rock.

Tar'pon or **Tar'pum,** a prized fish-food, akin to the herring, found off the Florida coast and in the Gulf of Mexico. This marine fish usually is six or more feet in length, and catching it furnishes exciting sport for fishermen with rod and reel. It has large, silvery scales, used in fancy-work. Another variety of the fish is found in Indian waters.

Tar'quin, the name of two kings of Rome. According to the story, Lucumo, the son of a Corinthian nobleman who had settled in Etruria, resolved to improve his fortune by going to Rome. On the way an eagle swooped down and snatching off his cap carried it high into the air, and then, descending, placed it on his head again. His wife, who was skilled in augury, prophesied from this omen the highest honors for her husband, who took the name of Tarquin. He became the guardian of the children of King Ancus Marcius, and was chosen to succeed him on the throne. His reign (B. C. 616–578) was a glorious one. He waged successful war against the Latins, Sabines and Etruscans, built Roman sewers which remain to this day, laid out Circus Maximus and the Forum, began the building of the Capitol, and instituted the great Roman games. He was, however, murdered after a reign of 38 years, through the influence of the sons of Ancus Marcius. His son, Tarquin the Proud, in 534 B. C. murdered King Servius Tullius, his father-in-law, and usurped the crown. He ruled ably though tyrannically, and made Rome the acknowledged head of Latium. But his heavy taxes and, especially, his persecution of the popular party, which had supported Servius Tullius, caused wide-spread discontent. At the same time a fearful omen encouraged his enemies; from the altar in the royal palace a serpent crept forth and devoured the entrails of the victim. At last came the rape of Lucretia by Sextus, the king's son. The senate deposed the tyrant, the army revolted against him, and he was forced to flee. Three attempts to reinstate him failed, and Tarquin's reign was followed by a republic at Rome. He died in B. C. 510 or 495. See Roman Empire.

Tar'rytown, N. Y., an attractive and historic village in Westchester County, on the eastern bank of the Hudson, opposite Nyack, and on the New York Central and Hudson River Railroad, 25 miles north of New York City. It is situated on Tappan Bay, above Irvington and below Sing Sing, and has many fine residences, besides schools and churches, including a Dutch church which dates from the close of the 17th century. Near by (at Irvington) is Sunnyside, the home of Washington Irving, where he sleeps in Tarrytown churchyard, rendered famous as the site of Irving's *Legend of Sleepy Hollow.* The village is also historically known as the place where Major André (*q. v.*) was captured. Tarrytown had an early settlement, though incorporated as late as 1870. Here are Irving Institute, Tarrytown Lyceum, the Catholic Institution of Mercy, a public library and industrial establishments and drill-works. Population 5,600.

Tar'sus, a city of Asiatic Turkey, on the Cydnus, about ten miles from the Mediterranean. It is built of stone, and is surrounded by a rich country. There are mosques, caravansaries and public baths. Wheat, barley, cotton and gall-nuts are exported. Tarsus is said to have been founded by Sardanapalus. Alexander captured it and it became a large and important city under the Romans. Tarsus is noted as the birthplace of St. Paul (*q. v.*). Population about 20,000, former population 100,000.

Tartar'ic Ac'id is found in grapes, tamarinds, pineapples and several other fruits, usually in combination with potassium. It is generally got from argol, which is produced during the fermentation of grapes. The acid is usually seen as colorless, transparent crystals, soluble in water and alcohol. The crystals, when gently warmed, become strongly electric. Tartaric acid is largely used in calico-printing and dyeing, for making lemonade and in drinks and lozenges as a medicine. The acid potassium tartrate, called cream of tartar, is extensively employed as an ingredient of baking-powders.

Tar'tars, in the widest sense include all the tribes living in the tablelands of central and northern Asia who are not of Aryan blood, that is, the Tartars proper, the Kirghiz, the Kalmucks, the Manchu Tartars, the Mongols proper and the Tungusians. In a narrower sense they comprise the Mongolian or Turanian people of Turkestan (*q. v.*). These tribes are the wandering Kirghiz, the Uzbegs, who are the ruling class, the Kiptchaks, the Buddhist Kalmucks of eastern Turkestan and many other tribes. In central Asia the words Turk and Tartar are used interchangeably to mean Mongolian. Tartar tribes, as distinct from Turks, formed the bulk of the great Mongolian migrations from the 4th to the 10th century, which planted the Tartar in southern Russia. Tartars and Turks (*q. v.*)

made up the hordes which followed Genghis Khan (*q. v.*) and Timur (*q. v.*).

Tar'tary, the name given formerly to a broad belt of territory reaching from the Seas of Japan and Okhotsk to the Caspian or perhaps to the Don. Khiva was formerly called Independent Tartary; and the Crimea was called Little Tartary, also Crim Tartary, from the name of the tribe which settled there in the 13th century. The name is applied now, if at all, to the Turkestani region.

Taschereau (*ta'sh'-rō̆'*), **His Eminence Elezear Alexander,** the first Canadian cardinal, was born at Ste. Marie-de-la-Beauce, Quebec, Feb. 17, 1820, his father being a judge of the queen's bench and his mother the daughter of the speaker of the first legislative assembly of Canada. He was educated at Quebec and Grand Seminaries, ordained in 1842, for four years a professor, later director and at last superior of Grand Seminary, and in 1860 director of Laval University as well. Vicar-general of the archdiocese of Quebec in 1863, he was consecrated archbishop in 1871 and elevated to the cardinalate in 1886. He died in Quebec, April 12, 1898.

Taschereau, Hon. Sir Henry E., was born in 1836. He was called to the bar of Quebec in 1857, and was a member of the Quebec legislature from 1861 to 1867. He was appointed a judge of the superior court of the province in 1871 and in 1878 a judge of the supreme court of Canada. He has written several textbooks on law. He became chief-justice of the court, and recently resigned.

Tashkend (*tȧsh'kĕnd'*), a city of Russian Turkestan (*q v.*), on Saralka River. It stands in a rich plain, and is surrounded by a wall 12 miles around, which is pierced by 12 gates The houses of mud, thatched with reeds, are scattered among gardens and vineyards. A fortified castle, which is the home of the governor, mosques, colleges, old temples and a bazar are the chief buildings. Gunpowder, silk, cotton-goods and iron are manufactured. A large trade is carried on with Bokhara, Mongolia and the Russian provinces of Orenburg and Petropavlovsk. Tashkend is an important military point and was long coveted by the Russians, who captured it in 1854. Population 155,673. See Vambery's *Travels in Central Asia*.

Tasmania (*tăz-mā'nĭ-ȧ*), (formerly known as Van Diemen's Land), is an island lying south of Victoria, Australia, and separated from it by Bass Strait. It is one of the original states of the Commonwealth of Australia (*q. v.*). The colony is a British possession, and at the beginning of the century was a penal settlement. Transportation of criminals to it ceased in 1853. Its area is 26,385 square miles, including Macquarie, divided into 18 counties. The aborigines are extinct. The capital is Hobart, on the south of the island, with a population of 24,655. The other chief town is Launceston (18,077). The principal occupations are agriculture and stock-raising; wool, wheat, hay and oats being the chief exports. Fruit is successfully cultivated, especially apples and pears, which in size, appearance and variety surpass those of Britain. The climate is healthy and temperate. The island contains tin, coal, gold and silver. Education is unsectarian, and compulsory for all children between seven and fourteen. Government is exercised by a responsible ministry, with a parliament consisting of two chambers. A resident governor represents the crown. Population about 190,000.

Tasso, Torquato (*tăs'sŏ, tor-kwä'to*), an Italian poet, was born at Sorrento, March 11, 1544. His father, also a poet, lived in exile, and Torquato was brought up by his mother, and went to school to the Jesuits till his tenth year, when he joined his father at Rome. He passed some years in study and in helping his father by copying and correcting, when he left for Padua to study law, where he wrote *Rinaldo*, his first poem, and, after a course of philosophy at Bologna, returned to become a member of a literary academy established by one of his friends. While at the court of Alphonso II, duke of Ferrara, in 1575, Tasso finished his masterpiece, *Jerusalem Delivered*, but rashly sent it to a society of scholars, critics and churchmen at Rome, instead of publishing it at once. Their criticisms drove him to madness. He believed he had been denounced to the Inquisition and one evening in 1577 he drew his dagger to stab a servant, whom he fancied to be one of his secret enemies. He was imprisoned, but escaped to his birthplace, where he recovered his reason. Two visits to Ferrara were followed by two returns of madness, after one of which he suffered an imprisonment of seven years, being set free in 1586. In 1595 the excitement of visiting Rome to be crowned a poet — the same honor which had been bestowed on Petrarch — caused an illness from which he died on April 25. See Milman's *Life of Torquato Tasso*.

Taste, the sense by which such properties of substance as sweet, sour, bitter, salt etc. are distinguished. The principal organ of taste is the tongue, especially its sides, base and tip. The soft palate and the arches of the palate also have the sense of taste. The sense of taste is weakened by any great change in temperature, either of heat or cold, as after holding the tongue in ice-water or in very hot water the taste of sugar will not be noticed. It is necessary that bodies to be tasted should be dissolved, so as to come in contact with the nerves of taste. Any substance which will not dissolve in the fluids of the mouth will be found to be tasteless, and only recognized by the sense of touch in the tongue. Bitters and acids excite sensations of taste in the most diluted forms. One part of quinine in 1,000,000 parts of water can be easily distinguished from pure water. The sense of smell (*q. v.*) is affected by most substances as well as the sense of taste, and taste and smell together form what is called the flavor. The great use of the sense of taste is to direct in the choice of food, and in the lower animals it is even a surer guide than in man. Usually articles that are agreeable to the taste are desirable for food.

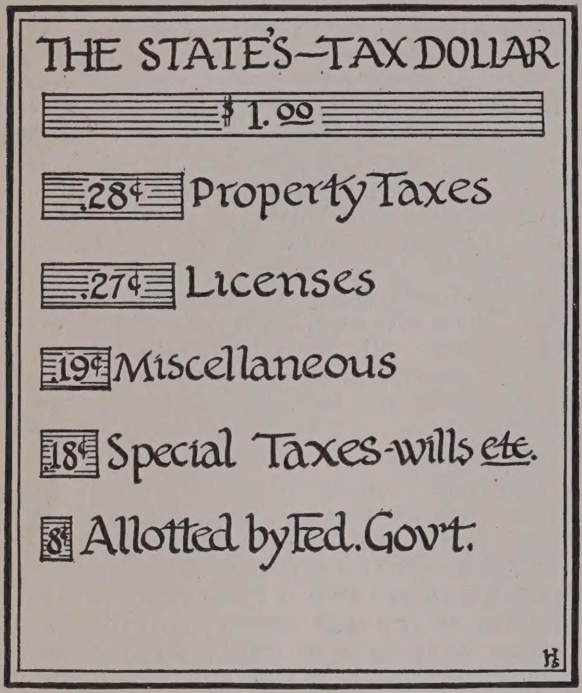
Tattoo'ing, a widespread custom among savages of marking the skin with figures by means of slight cuts or punctures and a coloring matter. It is almost universal in the islands of the Pacific. New Zealanders often cover the whole face and sometimes the chest, arms and other parts of the body with tattoo patterns. A boy is tattooed on entering manhood; the operation causes considerable pain but is born unflinchingly A bone, edged with teeth, is dipped in a thick mixture of charcoal and water, and hammered through the skin by means of a piece of wood. The marks last for life, and look black on a brown skin, but are dark-blue on the skin of a European or American. Tattooing seems to have been common among the nations with whom the Jews came in contact, as they were forbidden to practice it. The Bedouin Arabs and many tribes of American Indians tattoo, and sailors all over the world print anchors and other marks on their arms.

Tauchnitz (*touk'nits*), **Karl Christoph Traugott,** a famous German printer and bookseller, was born at Grosspardau, near Leipsic, Germany, in 1761 Bred a printer, he began a small printing-business of his own in Leipsic in 1796. Publishing and type-founding were added, and it became one of the largest establishments of the kind in Germany. In 1809 he began to issue classic works in such fine and cheap editions that they circulated throughout Europe. By offering a prize of a ducat for every error pointed out, he brought out a remarkably correct edition of Homer. In 1816 he introduced stereotyping into Germany and applied it to music, an experiment which had not been tried before. The well-known Tauchnitz edition of English authors, which numbers over 3,700 volumes, was begun in 1842 by his nephew. The older Tauchnitz died in 1836.

Taun'ton, Mass., county-seat of Bristol County, on Taunton River, 35 miles south of Boston. The falls of the river furnish water-power for its many factories. Taunton has long been noted for its manufacture of stoves and printing-presses, brick and iron, and its copper-works are the oldest and largest in the United States. Other products are tacks, machinery, fire-brick, crucibles, cotton, flannel, silver-plated ware and solid silverware. Taunton River is noted for its herring and shad fishing. There are a public library, Registry Building, Morton Hospital and the state insane asylum. Several ponds, many shade-trees and the green — a public square — help to beautify the place. There also is a fine bronze statue of Robert Treat Paine, a signer of the Declaration of Independence, occupying a conspicuous place, Taunton being Paine's home. Relics are preserved in Historical Hall, a building owned by the Old Colony Historical Society. Taunton has an excellent public-school system and Bristol Academy, located here, was incorporated in 1792. Taunton was settled in 1638 by a company from Taunton, England. It became a city in 1864. The site was known to the Indians as Cohannet. It was King Philip's favorite hunting-ground, and during King Philip's war it was saved from attack by the king's friendship for one of the citizens. Population 45,000.

Tau'rus, a range of mountains in Asia Minor, which forms the water-shed between the waters flowing into the Mediterranean and those flowing into the Black Sea. There are two divisions of the range, the Taurus on the south and the Anti-Taurus running northeast. Snow-covered mountain-tops are numerous, rising above thick forests that everywhere mantle the mountain sides. The highest peak is Arjish Dagh in the Anti-Taurus range (13,100 feet). Other noted peaks are Bulghar Dagh (11,400 feet), Gok Dagh and Ak Dagh, each 9,800 feet. The principal pass between Syria and Asia Minor, called in early times the Cilician Gates, is formed by the valley of the upper Cydnus.

Tax'es are levied on property and persons for the support of a government. In early times rulers often raised revenues by means of property owned by the government or crown or belonging to the king or prince himself. The possessions of subjects were often confiscated outright, fines were imposed, and in Europe for many years crimes were punishable by the payment of a stated sum of money. The Jews paid taxes mainly in the form of the first fruits of their lands and the firstborn of their flocks, and it was the heavy burden of taxation that caused the revolt of the Ten Tribes after the death of Solomon. In Athens a royalty on the products of the mines, import-duties, market-licenses, assessments on wealthy citizens and tribute from dependent nations were some of the ways used for raising money. In Rome, under the republic, to the spoils of conquered nations and their tribute were added, under the empire, tolls, taxes on grain, on the privilege of Roman citizenship etc. In Europe, under the feudal system, kings were supported by their own lands, and in war claimed the services of their barons and knights at their own expense. Venice, in the middle ages, began the modern system of taxation by taxing land and levying import-duties; Europe did not change until the French Revolution.



In the United States taxes are imposed by the federal, state and municipal governments. Federal taxes are in the form of tariffs (*q. v.*) on imports, excise-duties, (mainly on liquors and tobacco) and income taxes (*q. v.*). Import and excise duties are indirect taxes, that is, not paid directly by the consumer. The bulk of state taxes are laid directly on property. The heaviest taxes usually are those laid for local purposes by the county or city. Besides the ordinary city or county taxes, assessments are often made on property specially benefited, for opening streets or roads, for street-lamps, sewers, water-service, etc.

Taxidermy (*tăx'ĭ-dẽr'my*), the art of preparing the skins of animals for the purposes of the naturalist. In preparing small animals for stuffing, the skins are removed, the flesh clinging to them is cleaned away, and they are anointed with arsenical soap. This keeps the skin supple and prevents decay and attacks of insects. Larger skins are prepared with a powder containing arsenic, burnt alum, oak-bark and camphor. The animals are then stuffed and mounted.

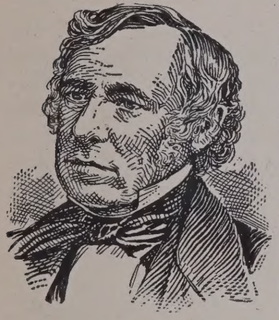
Taxon'omy deals with classification of plants. The plant-kingdom is so vast that no taxonomist can be a specialist in the taxonomy of all groups. Accordingly there are algologists, who classify algæ; mycologists, who classify fungi; bryologists, who classify mosses; pteridologists, who classify ferns. Ordinarily, when a man is called a systematist or a taxonomist, without any qualification, he is a specialist in the classification of seed-plants. The early attempts to classify plants were purely artificial, that is, there was no effort to indicate their real relationships For example, one of the earliest groupings of seed-plants was into herbs, shrubs and trees. This brought together many wholly unrelated plants and kept apart many which are closely related, as unrelated words are brought together in a dictionary by the accident of their first letter. The artificial system was most highly developed by Linnæus, who invented an elaborate scheme on the basis of the number of stamens and pistils in the flower. This scheme was used until quite recently, but it has now been entirely replaced by natural systems. These systems attempt to group plants together which are really related, a family in botany meaning about what the term means among human beings, if one substitutes species for individuals. A natural system of classification can only become perfect when the complete development and structure of every plant are known. Hence such systems are being constantly revised as knowledge increases

Tay, the largest river of Scotland, pours into the German Ocean a greater bulk of water than any other river of Great Britain. The Dochart is the chief feeder of Loch Tay, and from this lake the Tay flows past Dunkeld and Perth, at the mouth of the Earn widening into the Firth of Tay, from three fourths of a mile to a mile wide, and falling into the North Sea about ten miles below Dundee, after a course of 120 miles. It is navigable to Perth, and the tide flows a mile further up. The salmon-fisheries are valuable.

Tay'lor (James) Bayard, American author and traveler, was born at Kennett Square, Pa., on Jan. 11, 1825. At 17 he was apprenticed in a printing-office, and soon began to publish poems in newspapers and magazines. In 1844 he made a walking-tour of Europe, an account of which he published as *Views Afoot.* After writing for several newspapers, he joined the editorial staff of *The New York Tribune* in which appeared accounts of travels in California, Mexico, up the Nile, in Asia Minor, India, China and Japan. In 1878 he became minister to Germany. Taylor was a quick worker, throwing off many volumes of verse, fiction, sketches, essays, translations and criticisms, besides his 11 books of travel. As an original poet he stands high in the second rank. Some of his best travesties are in his *Echo Club.* Among the finest of his poems are *Bedouin Song, The Quaker Widow* and *The*

Old Pennsylvania Farmer. His masterpiece is the translation of Goethe's *Faust*, "one of the glories of American literature" and one of the finest translations in any literature. Perhaps the best of his novels is *The Story of Kennett*, which largely is his own story. Taylor died at Berlin, Dec. 19, 1878. Consult *Life* by Conwell.

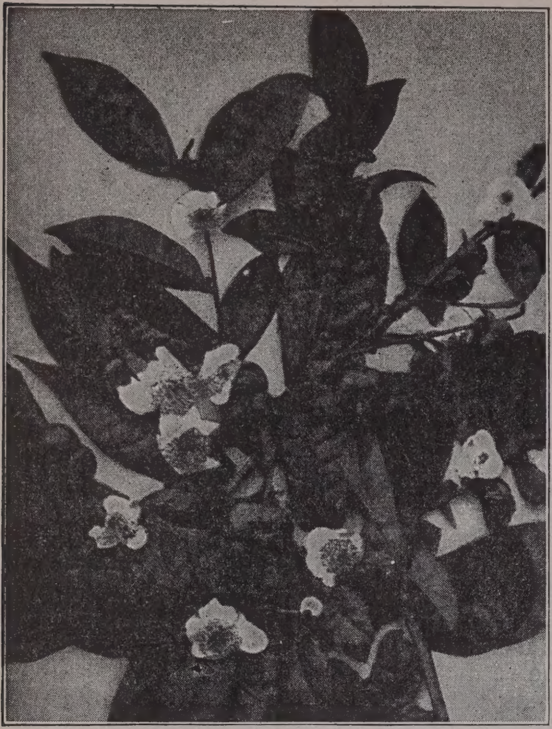
Taylor, Jeremy, a great English churchman, was born at Cambridge, Aug. 15, 1613. He was the son of a barber, and graduated at Cambridge University, becoming a clergyman before he was 21. During the Civil War he seems to have followed the royal army, and afterwards withdrew to Wales. Here, buried from the world for 13 years, he kept a school at Newton and employed his leisure in writing the works which gave him fame. Chief among them are *Liberty of Prophesying, Holy Living* and *Holy Dying*. At the Restoration, Taylor, as a stanch Loyalist, was made bishop of Down and Connor, an Irish see. Seven years later, he died on Aug. 13. 1667. See *Life* by R. A. Wilmott.



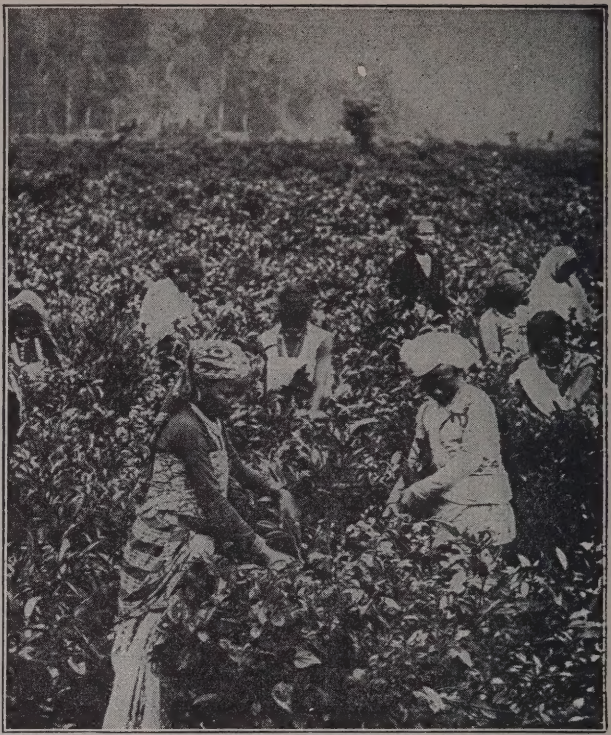
ZACHARY TAYLOR

Taylor, Zachary, twelfth president of the United States, was born in Orange County, Va., Sept. 24, 1784. His father was an officer of the Revolutionary War and one of the first settlers of Louisville, Ky., where Zachary was taken as a boy and lived till his 24th year, working on a plantation and getting but little schooling. Taylor entered the army in 1808 as lieutenant, and in 1812, as captain of a company of 50 men, two thirds of whom were down with fever, he defended Fort Harrison on the Wabash against a large force of Indians, led by Tecumseh (*q. v.*), the famous chief. Promoted to the rank of major for his gallantry, he was employed during the war in fighting the Indian allies of England. He built Fort Jesup in 1822, and ten years later served as colonel in the Black Hawk War. In 1836 he was ordered to Florida, where he gained an important victory over the Seminole Indians at Okeechobee, for which he was appointed brigadier-general and made commander of the United States forces in Florida. Just before the breaking out of the Mexican War Taylor was ordered to Corpus Christi, occupying the point with a force of 4,000 (1845). Next spring he marched across the disputed territory between the Nueces and the Rio Grande, and built Fort Brown opposite Matamoras. The Mexicans demanded that he retire beyond the Nueces, and on his refusal Arista crossed the Rio Grande with a force of 6,000. On May 8, 1846, Taylor defeated him at Palo Alto with 2,300 men, and a few days later drove him from a new position at Resaca de la Palma across the Rio Grande. War was at once declared by Congress; 50,000 volunteers were called for; and Taylor was made a major-general, reenforced, and ordered to invade Mexico. On Sept. 9, with 6,625 men, he attacked Monterey, which was defended by 10,000 regular troops. After ten days' siege and three days' hard fighting it surrendered. All but 5,000 volunteers and 500 regulars of his army were now sent to aid General Scott at Vera Cruz, and Taylor was left with this small force to oppose President Santa Anna's army of 21,000. He took a strong position at Buena Vista, fought a desperate battle and won a decided victory. This victory against enormous odds caused the utmost enthusiasm, and Taylor, known as "Old Rough and Ready," was nominated by the Whigs for the presidency and elected. Entering the White House in 1849, he found a Democratic majority in Congress, with the small but vigorous Free-Soil party holding the balance of power, while such exciting questions as the admission of California, the settlement of the boundaries of Texas and the organization of the newly-acquired Mexican territories were stirring the nation. Worn out by the unaccustomed turmoil of politics, the rough, good-natured soldier did not long enjoy his honors, but died on July 9, 1850, 16 months after his inauguration. See *Lives* by Fry, Montgomery and Stoddard.

Tea, the prepared leaves of *Thea Chinensis* or the drink made from them. The plant probably is native to India, and was introduced into China and Japan. Tea has for ages been a favorite beverage in China, and now is one of the world's most generally used non-alcoholic drinks. The very best qualities do not bear transporting, and are seldom found outside of the country where grown. In the intense tropical conditions in which the native plants grow they become small trees; but in the colder climate of China and Japan they become bushy, with smaller and tougher leaves. In cultivation the shrub grows to from three to six feet, is branchy, the leaves from two to six inches long. The third year the first crop is obtained. There are three pickings a year; in April a rare quality is obtained from the new leaves, May is the time of the principal picking, and a very inferior grade is obtained from a later harvest. The black and green teas are not derived from different plants, but are the results of the different methods of preparation, the black tea being given long exposure to the air in drying. Enormous quantities of tea are produced in China, Japan, India, Ceylon and Java, but most of it is used by the native populations. Our southern states are well-adapted for varieties of tea, the plant not

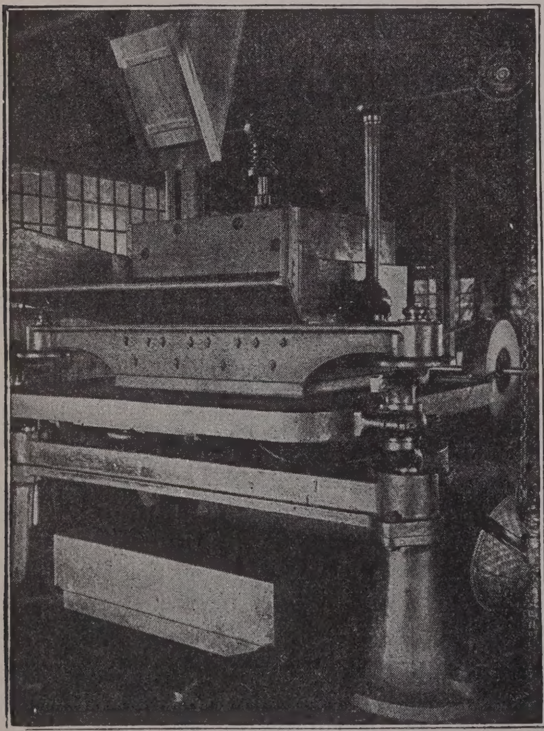


TEA PLANT. This picture of the tea plant shows the leaf, blossom and seed pods. The bush often shows blossoms and seed at the same time. If left to nature, the tea plant will grow to a height of twenty feet, but as cultivated it is kept down to from two to five feet by constant pruning. The average tea tree lives for fifty years, though it is said that there are records in China of trees living three hundred years.



From Brown Bros.

PICKING TEA IN CEYLON. Here the Tamil coolies are seen at work under the watchful eye of the task-master. The tea baskets hold about fourteen pounds and the average is three baskets per coolie per day. The picking begins about the end of April and usually lasts until the end of November. Only the tip of the shoot and soft leaves are picked.

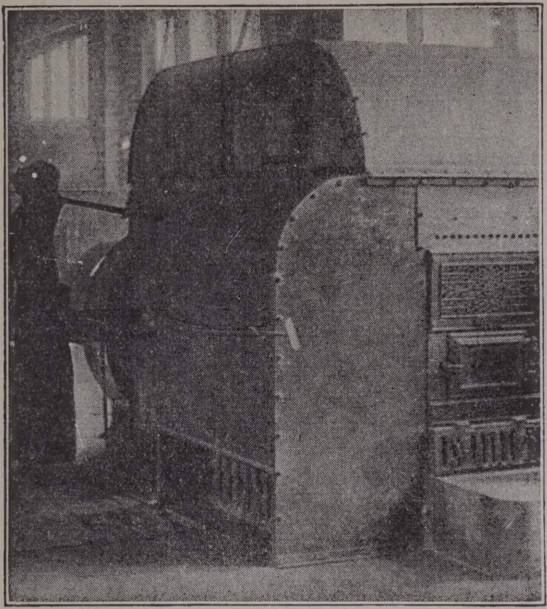


From Brown Bros.

TEA ROLLER. After the tea is picked it is spread out on trays or racks and left to wither from eighteen to twenty hours. It is then taken to the roller, which we see in this picture. The object of rolling is to squeeze out the moisture left after withering, and to give the leaves a good twist.

From Brown Bros.

FERMENTING. The next process is fermenting. The leaf is spread on the floor of a cool room, covered with wet cloths and allowed to ferment until it turns to a bright copper tint. This is when black tea is wanted. If green tea is desired, the leaves are not fermented. Green tea and black tea may come from the same tree; the difference is due to the manner of treatment after picking.



FIRING. After fermentation the leaf is spread on wire trays and pushed into this machine which we see in the picture, where a current of hot air from 210° to 220° Fahr. is passed through it The tea comes out dry and brittle and of a black color.

Copyright by B. L. Singley

SELECTING TEA LEAVES. After the tea has been sifted and separated into grades, the tea that is intended for exportation is spread out on a table and gone over once more, usually by girls who divide the leaves, the larger from the smaller, and pick out all objectionable bits that remain.

From Brown Bros.

SIFTING. After firing the tea is run through the sifting machine which sorts it into various grades known in the market as Broken Orange Pekoe, Orange Pekoe, Pekoe Souchong, Fannings and Dust. This picture shows a sifting machine and different grades of tea spread on trays.

requiring a tropical climate, and prior to the Civil War many southerners raised their own tea. In South Carolina commercial tea-raising has met with success, and trials are making in other southern states.

Teachers Col'lege, Columbia University, New York City, was founded in 1880 as an association for teaching home-economies. In 1884 it was reorganized under the name of the Industrial Education Association, with headquarters at 21 University Place. In 1887 it was finally incorporated as the New York College for the Training of Teachers, afterward Teachers College. As early as 1890 it became a part of Columbia University, though it retains its own trustees and administration. In 1894 the present fine site on West 120th St. was occupied. The first president of Teachers College was Nicholas Murray Butler. He was succeeded by Walter L. Hervey, who remained until 1897, when James E. Russell became dean. The college now represents an investment of some five million dollars. A new school of domestic art and science was completed in 1909. The college offers courses in education, anthropology, fine arts, biology, domestic art, domestic science, economics and social science, English, French, German, Greek and Latin, geography, geology, history, kindergarten, manual training, mathematics, music, philosophy, ethics, psychology, physical science and physical education. For admission two years of college or normal-school study are required. The general diploma is conferred upon students who have successfully completed one of the undergraduate courses offered; and a departmental diploma upon those who have studied for particular branches of school-work. The graduate-department is larger than any other in Columbia University, having nearly 700 members in 1909. It offers many courses in education, leading to the higher degrees. Its graduates are usually appointed to university, college, normal-school, secondary and public-school positions; or to school-superintendencies or principalships.

There also are many extension-courses offered, both in the college and in buildings easily accessible.

The college has two observation and practice schools — Horace Mann School and Speyer School. Student-teachers observe classes in Horace Mann School, but do not teach them. Horace Mann School, with about 1,000 pupils, has two kindergartens, seven grammar-grades and a five-year high-school course. The tuition is $75 in the kindergarten, $150 in the primary grades, $200 in the grammar grades and $250 in the high school. The school is on Broadway, from 120th to 121st street, in a building given by Mr. and Mrs. V. Everit Macy.

Speyer School, with about 200 pupils, furnishes opportunity for practice-teaching and experimentation. It is entirely free. It occupies a building at 94 Lawrence Street, the gift of Mr. James Speyer. In the afternoons and evenings the school carries on neighborhood-work. Gymnasium, cooking, sewing and carpentry classes are among the school activities.

Bryson Library of Teachers College supplements the university's library of 400,000 volumes with a special collection of over 40,000 volumes, chiefly upon the subject of education. It is open to students and officers of the university and to public-school teachers in the city.

The college publications include *The Teachers College Record* and *The Teachers College Contributions to Education. The Record* is issued continuously every other month except July. *The Contributions* consist of papers representing original investigations by advanced students or officers, edited by the dean and the college professors in charge of the subject treated. From four to six numbers appear each year.

The college and its schools have a staff of 150 instructors, including many distinguished educators and investigators. It represents a university school of education upon the same footing as the schools of law, medicine and science. The total attendance of the college and its schools is about 3,500 persons.

Teachers' Institute, a gathering of public school teachers of a state, county or city. An institute is held yearly or oftener, and lasts usually from one to two weeks. Instruction is given by lectures, class-drills etc. in the best methods of teaching and governing schools. Sometimes actual classes of children are taught in the presence of the members of the institute, which is probably the most profitable of the many methods in use. The members of the institute, as well as specially engaged lecturers, take part. Institutes have proved a valuable help to teachers, and have raised the standard of teaching throughout the country. The first institute was held by Henry Barnard, state superintendent of schools in Connecticut, in 1839.

Teach'ing, Method of. Method in teaching depends essentially upon methods of learning. The latter are commonly divided into three classes: the trial-and-error method, imitation and reasoning. All learning aims primarily at doing something which the learner is not able to accomplish by instinct, but must master by experience. The simplest method, that of trial-and-error, consists in trying again and again until finally, largely by accident, the desired result is gained. The experiment usually needs to be repeated many times before the act is thoroughly learned. Then it becomes habitual and practically automatic. This method is almost the sole one with the lower animals, and by it nearly all the simpler acts of human skill are learned; as grasping, standing, walking, etc. If the learner possesses intelligence enough to imitate, he can shorten the method of trial-and-error by copying the successful acts of others. Imitation, by which older children acquire advanced types of skill, as piano playing, use of tools, etc., does not abandon the trial-and-error method, but simply aids it in assisting practice. The reasoning method consists in solving a new situation by applying one's previous knowledge. This method of thinking instead of blindly experimenting is only employed by the most intelligent beings.

The simplest methods of teaching mankind, that is, rendering shorter and easier the process of trial-and-error, are to present a model for imitation, or to explain how the act should be performed. These methods, however, will not suffice when the aim is to prepare the child to solve the problems he will meet in his later life. The utmost art of method must be used in order that education may help life, and learning lead to practice. The two principal criticisms of the old-fashioned school method are: first, failure to provide a proper and adequate motive for learning, instead of which pure school motives such as fear of punishment and rivalry are used; second, failure to apply acquired knowledge to actual life problems.

Reformers of method have met the first criticism by developing interest in school work, and the second by the adoption of certain devices of which the most important are the correlation of subjects, and the inductive method. The latter is based on the idea that the aim of all instruction is the mastery of general concepts, principles, or laws, because only in generalized forms can knowledge be applied to new conditions. But to be able to recognize the principle, when conditions vary, the learner must first master the principles by starting from the concrete facts upon which the principles are based, and by his own insight discern the generalization involved. Moreover, he must be practiced in the application of these principles. In accordance with these requirements the so-called "formal steps" have been evolved by Herbart, Ziller, Rein, and Charles and Frank McMurry. They constitute the method of the recitation, and may be described as follows. First, the subject of study for the lesson is announced. Second, preparation is undertaken, in which pupils tell what they know concerning the lesson. Third, presentation is developed, in which unsettled questions are attacked; this may take the form of lecture by teacher, study of text, or original efforts by pupils by means of excursions, laboratory experiments, etc. Fourth, comparison is suggested; facts similar to those studied are recalled and compared. Fifth, generalization is made, in which principle behind fact is deduced. Sixth, application is worked out to insure that the principle of step five will be employed to explain new cases. This treatment may require several lesson periods, and is called a lesson unit.

Along these lines of educational thought our systems have developed three plans:

SOCIALIZED RECITATION.
PROJECT METHOD.
SUPERVISED STUDY.

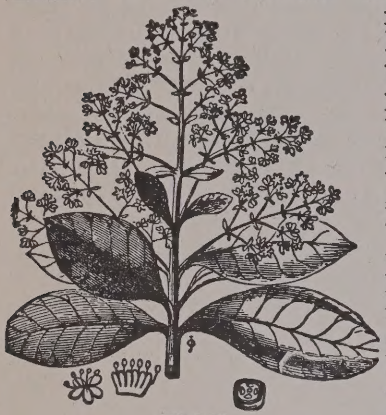
Supervised Study. The aim of Supervised Study is to abolish the system by which the teacher merely assigns the lesson at school, and later hears the recitation, leaving the preparation to be done away from the instructor's guidance. As this system has been generally worked out, the first ten minutes of an hour recitation period are spent in rapid review of previous day's lesson. The next forty minutes are given to the study of the new lesson under teacher's supervision. The work is first carefully explained and general difficulties pointed out. The children then study the lesson, the teacher assisting individual pupils. The final ten minutes are devoted to general discussion or statement of next day's assignment.

The Project Method. The project is a vitalized method of connecting school information with real life. A worth-while problem is suggested either by a pupil or the teacher, and class works out the solution in a natural way. The problem must be of such character that in working it out the children will of necessity learn the knowledge demanded by the curriculum. The teacher's function is to offer suggestions and tactfully guide the work, never interfering with the initiative of the pupils. A project may cover any length of time; some require only one lesson period, while others extend over several weeks. The following are two illustrative project suggestions. 1. An old, worn-out automobile could be restored in the metal shop. 2. In developing interest in letter-writing, one could start with the beginning of the United States mail service and trace its development, bringing in various departments and showing necessity for rules in addressing, etc. Some good books on the subject are: *Project Method*, Wilson; *Project Work in Education*, Stockton; *A Project Curriculum*, Wells; *Project as a Teaching Unit*, Snedder.

Socialized Recitation. Socialized Recitation is a recitation participated in and conducted by the pupils. The teacher may offer advice and assist in the preparation previous to the recitation. The object of the socialized form is to offer greater opportunity for self-expression, and to develop dignity and self-control, since pupils are honor bound to discuss the lesson helpfully, courteously, and well among themselves. The teacher often assumes the role of a pupil.

In the field of general interest Professor Dewey suggests that the motive by which interest should be secured comes through anticipation of application. To get this motive and dependent interest, his method is to have the school room a little society in which living problems are being continually worked out. For example, the child learns to read because only thus can he get certain information that he needs in the group activity of the school. See APPERCEPTION; CORRELATION; ASSOCIATION OF IDEAS; CHILD-STUDY; EDUCATION, MODERN; INTEREST; MEMORIZING; and MENTAL DISCIPLINE. For analytic and synthetic methods consult *Psychology for Teachers*. Consult *The Method of the Recitation*, McMurry; *Principles of Teaching*, Thorndike Seiler; and *The Educative Process*, Bagley.

Teak, the name of *Tectona grandis*, a member of the verbena family. It is a forest-tree of India, and its timber is prized as by far the most serviceable of all timbers for ship-building. The timber resembles mahogany, and is more durable and much lighter than oak. There also is a teak highly valued for furniture, exquisite carved pieces being offered for sale. The color of the wood is a dark brown.



TEAK

Teal, small ducks belonging to the group of river-ducks. They are abundant in Europe, America and most other parts of the world. There are ten or fifteen kinds in the United States. The two best-known forms are the green-winged and the blue-winged teal. The former is a beautiful little duck, about 14 inches long, abundant during migrations and one of the best ducks as food. It feeds on seeds of grass, small acorns, fallen grapes, water-insects, small snails and worms. The blue-winged teal, with a blue band across the wings, is larger, being about 16 inches long. It is the most numerous of the smaller ducks in the eastern United States. West of the Rocky Mountains it is replaced by the cinnamon teal.

Tech'nical Schools. This term embraces all institutions whose object is to prepare its students directly for some particular career or vocation as opposed to those giving a so-called liberal education. Usually, however, it is restricted to that class of schools especially devoted to the investigation and teaching of industrial and mechanical arts and sciences, as civil, mechanical, mining, electrical, chemical and sanitary engineering, architecture, draughting etc. They usually are institutions of college or university grade, to which the titles of engineering schools, institutes of technology, polytechnic institutes and schools of applied science are variously given. The great majority confer only the degree of bachelor of science at the end of the four years' course and the professional degrees of C.E. and M.E. only after the completion of at least a year's graduate work in residence and three years of successful professional work. They have arisen almost invariably in response to the industrial demands of the district in which they were founded, as, for instance, the Colorado School of Mines. They practically are a development of the last half-century. On the basis of control there are three types of technical schools in the United States: those founded by private individuals and relying for support mainly upon private endowment, as Rensselaer Polytechnic Institute of Troy, N. Y.; those forming a department of some college or university (as the engineering departments of the Universities of Michigan, Pennsylvania etc.) and usually sharing in the common resources of the university of which they form a part; and those supported largely if not entirely by state government expense. The majority of these are connected with some university. Massachusetts Institute of Technology at Boston perhaps is the most famous technical school in America.

Teck, Alexander, Augustus, Frederick, Prince of (1874-), who succeeded the Duke of Connaught (*q. v.*), as Governor-General of Canada, is a brother of Queen Mary and husband of Princess Alice of Albany, granddaughter of Queen Victoria. He was educated at Eton and Sandhurst, served in Matabeleland in 1896, and in the Boer War (*q. v.*), in both of which he won the Queen's medal. He is the third son of the late Duke of Teck.

Tecumseh (*tē̇ kŭm'sĕ*), a famous chief of the Shawnee Indians, was born near the site of Springfield, O., about 1768. Elskwatawa, his brother, the prophet, preached against the use of the white man's liquor and food, and about 1805 Tecumseh tried to gather all the western Indians into a confederacy against the whites. As a result, 400 gathered at Greenville. In 1811, while the chief was away urging the Seminoles and Creeks to rebel, General Harrison marched on his encampment to demand that plunder be given up and that the warriors go back to their tribes. The prophet decided to fight, but was worsted and his prestige among the Indians destroyed in the battle of Tippecanoe. On the outbreak of the War of 1812 Tecumseh led a large force to the support of the British in Canada. He was made a brigadier-general in the English service, and fought bravely in several battles. He was wounded at Maguaga and also while bravely defending a ford on General Proctor's retreat before General Harrison. At the siege of Fort Meigs, where he and Proctor held joint command, he saved the lives of the American prisoners. At the battle of the Thames in Canada he believed he would be killed. So he laid aside his general's uniform and sword, and, dressed as an Indian warrior, fought desperately till he was shot (Oct. 5, 1813). It is believed that he was killed by Richard Mentor Johnson. See *Life* by Benjamin Drake.

Teeth are structures derived from the skin of the mouth, involving both the epidermis and the dermis. Only those of vertebrated animals need be considered. In fishes and snakes they usually are sharp processes without sockets, arising from bones of the jaws and the mouth-parts. In crocodiles and all mammals they are located in sockets. The teeth always show the habits and food of animals, and, therefore, are much used by naturalists in classification. They are of great importance to the students of fossil life, because they are usually well-preserved on account of their hardness. They have been of great service in tracing the evolution of animal life during geological periods. In the herb-eating animals there have been slow changes in the pattern of the crown of molar teeth, which can be read by students like hieroglyphics. The teeth of mammals contain living pulp on the inside provided with nerves and blood-vessels; this is surrounded by dentine or ivory, a bony substance produced from the dermis. The dentine is covered above the jaws by enamel, which is the hardest substance in the human body. The roots are covered with cement, which joins the enamel and sometimes extends into it. When the enamel is broken or worn through, the much softer dentine is exposed; this decays and leads to cavities in the teeth and to their destruction, if the cavities are not cleaned and filled. The typical number of teeth in mammals is 44, 22 on each jaw, and not 32, as most people suppose, because the latter number is found in man. Teeth of mammals are divided into incisors or cutting-teeth, canines or sharp tearing-teeth, premolars which appear earliest, and molars or grinding-teeth. There usually are two sets which appear in succession, the milk-teeth or temporary ones and the permanent set. The teeth are subject to great modifications. The great cutting-teeth of beavers and the tusks of elephants are modified incisors; the tusks on the walrus and those of the wild boar are enlarged canines. The molars or grinding-teeth have a pattern on the crown that is characteristic of the different groups of mammals.

Tegner (*tĕng'nâr'*), **Esai'as,** a popular Swedish poet, was born at Kyrkerud in 1782. He was graduated and appointed lecturer on æsthetics at the University of Lund. His poem, *Sweden*. which appeared in 1811, brought widespread popularity. Next year he took charge of a parish, besides the chair of Greek in the university, and yet found time to write, among other works, *Axel*, a poetic romance, and his epic, *Frithiof's Saga*, which at once became the most popular poem of Sweden. Its author was at once made bishop of Wexio, sat in the national legislature in the chamber of the clergy, and became noted as a political leader and speaker. When just about to be appointed archbishop Tegner had an attack of insanity, which he inherited. He recovered his sanity but not his health, and died in 1846. *The Children of the Lord's Supper* has been finely translated into English verse by Longfellow.

Teheran (*tĕ-h'răn'*), capital of Persia, stands 70 miles south of the Caspian Sea, on a wide, stony plain. On the northeast are the Elburz Mountains, the highest peak of which is Demavend, 22,000 feet above the sea. The town is built mainly of mud-houses, packed within a mud-wall 20 feet high and four miles around. The finest building is the bazar of Taki Khan. In the suburbs are the shah's palace, called the ark or citadel, and the castle of the *kajars*, another royal home. In 1849 a polytechnic school was opened with European professors, introducing science and the western languages. Carpets, shoes, hats and linen goods are manufactured. Teheran was unimportant until made the capital of Persia by Aga Mohammed Khan about 1796. Population 280,000.

Tehuantepec (*tâ-wän'tâ-pĕk'*), an isthmus of Mexico, between the Bay of Campeche on the Gulf of Mexico and the Bay of Tehuantepec on the Pacific Ocean. Its narrowest part is 130 miles wide. It contains lakes, lagoons and Coatzacoalcos and Tehuantepec Rivers. One of the several plans to join the Atlantic and Pacific by a ship-canal proposed crossing this peninsula, in part by deepening and widening Coatzacoalcos River. The Mexican government on Jan. 23, 1907, opened its interoceanic railway (192.42 miles long) from the mouth of the Coatzacoalcos to the Pacific port of Salina Cruz. It saves 10,797 miles from New York to San Francisco through the Straits of Magellan.

Tekeli, Emeric, Count, a celebrated Hungarian patriot, was born in Zips, Hungary, in 1656. His father had taken part in a plot to free Hungary, and after his death Tekeli was forced to flee to Poland. Unable to get possession of his estates, he invaded Hungary, when but 22, at the head of 20,000 men furnished by the prince of Transylvania. He was joined by crowds of his dissatisfied countrymen, made inroads into Austria, Styria and Moravia, and forced Leopold I, the Austrian emperor, to make promises which gained part of

Tekeli's followers. But Tekeli would not trust the emperor and refused to disarm. He was supported by the Turks, who crowned him king of upper Hungary, and he took part in the famous raid of Kara Mustapha into Austria. Soon many of his partisans deserted him, and his friends, the Turks, imprisoned him, but again in 1690 he was at the head of a Turkish force with which he burst into Transylvania, routed the Austrians and roused the Hungarians to renewed efforts for freedom. But several Austrian victories over the Turks forced them to sign a treaty agreeing no longer to support the Hungarian rebels. As a result, Count Tekeli was driven from the country for whose deliverance he had risked everything, and died at Constantinople in 1705. His wife was a noted beauty, but more noted for her gallant defense of her castle against an army of Austrians.

Tel′egraph an instrument for transmitting signals to a distance. Unless otherwise specified the word is generally used to mean the electric telegraph, which is the only one we shall here discuss.

Electric signals appear to have been first transmitted on a commercial scale by Wheatstone and Cooke in England in 1837. At each end of the "line," which consisted of five insulated metallic wires, they placed five galvanometers. Different combinations of deflections to the right and left indicated different letters. (See GALVANOMETER.) Later a single galvanometer was used, different combinations of deflections indicating as before different letters. About the same time S. F. B. Morse (*q. v.*) in America succeeded in perfecting a receiver in which the signals could not only be seen and heard, but were automatically recorded. This is the instrument which was in universal use in the United States until operators learned to read the message by the click of the instrument. Accordingly, for ordinary work a telegraph line is provided at each end with a *battery* for producing an electric current, a *key* for opening and closing the circuit and a small electromagnet, with pivoted armature, the so-called *sounder* or *receiver*. More recently the Wheatstone bridge has been applied to the telegraph line in such a way that two messages may be sent over a line in opposite directions at the same time. This is called the *duplex telegraph*. Edison has invented a method for sending two messages over the same line in the same direction at the same time. This is known as the *diplex telegraph*. By combining these two, four simultaneous messages may be sent. This system is called the *quadruplex telegraph*. Various plans have been suggested for sending even more than four messages at once. This is called the *multiplex telegraph*. Rowland (*q. v.*) perfected a system which will not only transmit six or eight simultaneous messages, but will deliver them printed on a typewriter; and not only so, but the sending instrument of the Rowland telegraph is merely the ordinary keyboard of a typewriter. For details concerning these various systems and concerning the important subject of submarine telegraph, first worked out by Lord Kelvin, the student is referred to the larger treatises.

Telegraphy and Telephony, Wireless. The story of radio begins in 1873, when James Clerk Maxwell (*q. v.*) published his famous guess about the ether. His guess, made as a result of mathematical studies of the ether (*q. v.*) was that if it existed and carried light, it should also carry electro-magnetic disturbances.

A German physicist, Heinrich Hertz (*q. v.*), became interested in Maxwell's ideas, and in 1888 succeeded in transmitting electro-magnetic disturbances across his laboratory, in such a way as to prove them genuine ether waves. Some years later Hertz's experiments were described in a university class attended by Marconi (*q. v.*), and the young Italian, enthused by the idea, started to work it out commercially. After achieving interesting results, he asked the Italian government to help him in further experiments. The government was not interested, and Marconi submitted his ideas to the British postoffice. There he received support, and in 1896 succeeded in transmitting radio messages a distance of ten miles. That success was the beginning of modern radio.

WIRELESS TELEGRAPHY RADIO

Radio, as we have seen from its early history, depends upon ether for its existence. How "ether" carries it we can see from a simple comparison. Imagine a strong cord with beads strung upon it, imbedded in a huge bowl of jelly. If this cord be jerked suddenly, the jelly will be distorted. When the cord is released, the jelly will snap back into its normal state.

Exactly the same effects are caused in ether by electrons. As told in the article on atoms (*q. v.*), electrons consist of minute specks of electricity. Scientists tell us that an electric charge, such as we find in radio antennae, consists simply of a mass of free electrons—that is, electrons not combined into chemical atoms. These electrons correspond to the beads in our jelly experiment, and the ether corresponds to the jelly.

If now the electrons are shifted suddenly, by means that we shall describe later, a strain radiates outward through the ether. This strain is the electro-magnetic disturbance of Maxwell's guess. Since it was discovered by Hertz, we call it a Hertzian wave. Experiment tells us that it travels through ether with the astounding velocity of 300,000 kilometers, or 186,000 miles, a second. The distance it travels depends, of course, upon the strength of the disturbance creating it. Such waves, created in suitable form, cause radio.

By returning to our jelly comparison, we can understand receiving. Imagine a second string of beads imbedded in the jelly near the first. When the first string is jerked, disturbances radiate outward from it. When these disturbances pass the second string, they cause it to move.

One simple fact will enable us to translate this comparison into terms of radio. Scientists tell us that electric current is nothing but a mass of negative electrons streaming through a conductor. When, therefore, the electrons in the receiving antenna shift in response to a passing ether wave, this shift constitutes a momentary current through the receiving system. By means of instruments, this current can be made to operate a receiver, as described later.

RADIO TELEGRAPH TRANSMITTING

As we might guess from the nature of radio, the chief difficulty in transmitting by telegraph signals is in giving a sufficiently powerful "sending shock" to the ether. It was in solving this problem that Marconi achieved his great success, since the general nature of radio had already been worked out by Hertz.

The chief piece of apparatus in Marconi's early system was an induction coil (*q. v.*), whose primary circuit was opened and closed with a telegraph key. During the time the key is down, the secondary of the coil generates a high-voltage, alternating current, which cannot pass, except under certain conditions, because of a spark gap inserted in the secondary circuit. It is in these conditions that we find the secret of Marconi's success.

In his transmitting apparatus, Marconi ran a wire from one side of the spark gap to the ground. The other side he connected to a system of overhead wires called an "antenna." The antenna and ground then act together as a condenser—a "condenser" is a device for storing electricity—and they store the current from the induction coil until it becomes strong enough to jump the gap. This jump, evidenced by a spark, consists of a rush of heaped-up electrons, and this sudden rush imparts a shock of the desired strength to the ether. Normally the system gave such a jump when each alternation of current in the secondary attained maximum strength.

Until the invention of the audion or "vacuum valve," all sending consisted of improvements upon this scheme. The chief improvements were (1) substituting high-frequency, alternating current dynamos for the induction coil (2) devising methods for tuning, and (3) development of undamped waves.

RECEIVING RADIO

The "electric shift" between the antenna and ground of a receiving set—the shift caused by a passing Hertzian wave—is far too feeble to actuate receiving instruments. In order to receive, we must use this shift as a sort of trigger to "set off" local currents strong enough to run the receivers.

In his early systems, Marconi used as a trigger, a device invented by Professor Branly of Paris, called a "coherer." It consisted of a glass tube, half-filled with metal filings, and closed at each end by a metal plug. The antenna was connected to one plug and the ground to the other. The local circuit, consisting essentially of a battery and a receiving device—usually a telephone receiver—also led through the coherer, and a "tapper," to be described later. Since the loose filings offered high resistance to the passage of electric current, no current could pass from the battery to cause signals in the receiver.

When a Hertzian wave passed, however, the "electric shift" between the antenna and the ground jerked the filings into line with each other, and this alignment made them good conductors of electricity. Current from the battery now passed through and actuated the receiver, giving a signal. Thus the necessary "trigger action" was attained.

The arrangement had only one defect. The filings, once aligned, remained aligned. This meant that unless something were done, the receiver would sound continuously, once a Hertzian wave had passed. The difficulty was surmounted by means of a tapper, a device which acts like the breaker on an induction coil. (See the article on the induction coil for an explanation.) The tapper was mounted to strike the glass tube of the coherer, and the local circuit was led through it. As soon, therefore, as the filings were aligned, a blow from the tapper broke the alignment. If Hertzian waves were still passing, they restored the alignment; if not, it remained broken. Thus the local current flowed intermittently, causing a buzzing note in the receiver, as long as Hertzian waves passed. When they ceased, the receiver was silent.

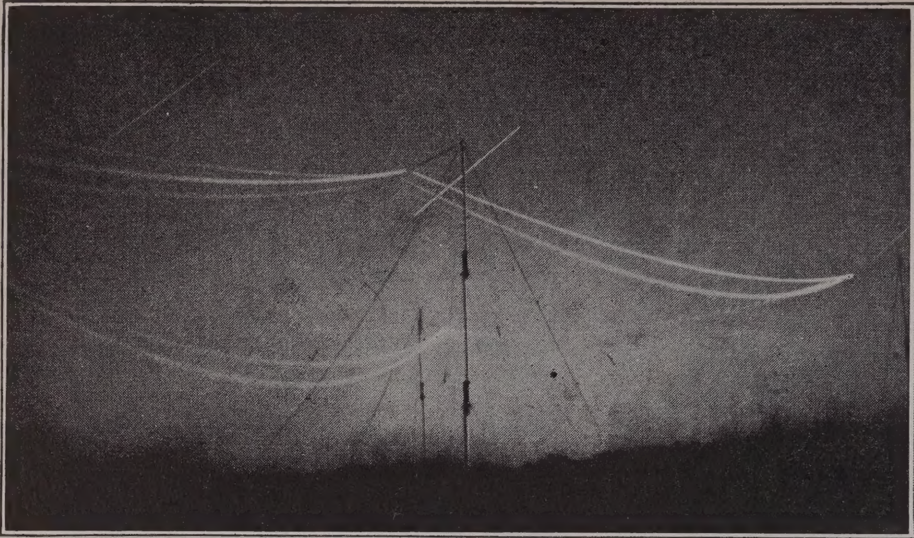
The coherer soon was supplanted by other detectors. Since all these devices have given way now to the audion, there is no need to describe them.

THE WONDERS OF RADIO

It has not been long since, advancing beyond wireless radio telegraph transmission, the world has enjoyed wireless radio telephony. The chart facing this page was drawn by a skilled radio builder, and shows two simple receiving sets. There are many different styles of parts to a radio set, and several different methods of connecting, but the principles of activity and function are the same, and these simple drawings present the basic principles. The following article explains the nature and function of the parts.

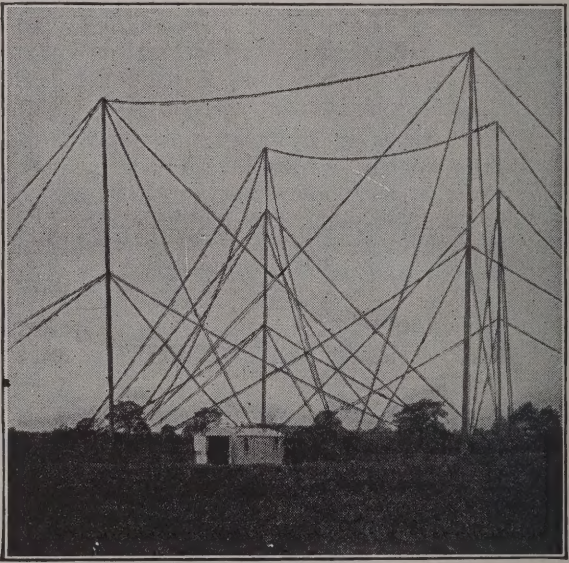
When a stone is thrown into a pond, we know that ripples are created which move outward and finally break themselves upon

MARCONI'S OWN EXPLANATION

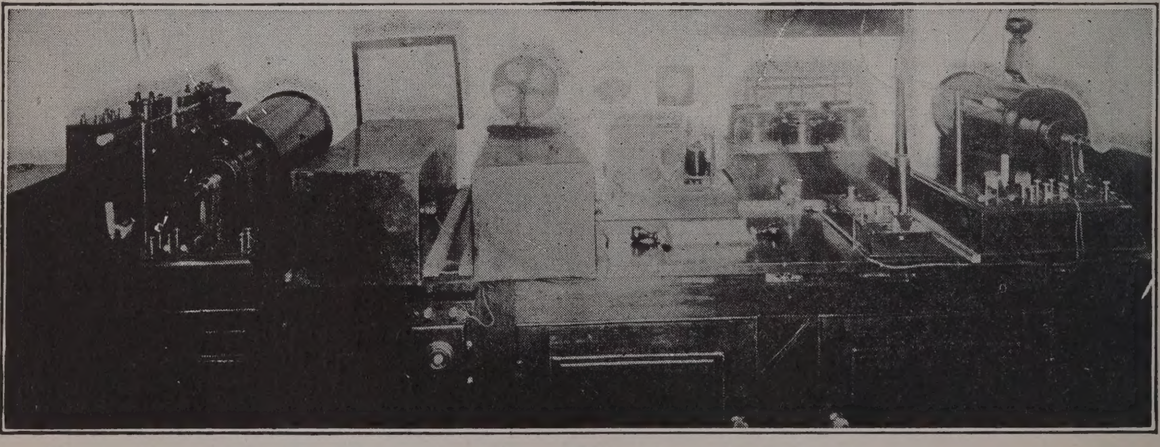


This is what a wireless message would look like if you could see it. It is a remarkable photograph and shows the electric waves passing along a wire at a station. They are invisible to the naked eye.

ON the right of the photograph of the wireless message is a picture of Marconi, the inventor of the wireless telegraph. He says that the electric waves which carry wireless messages are like the ripples which go out in all directions when you drop a pebble into the water. Sound is also made by waves—different sounds by waves of different lengths. The waves sent out by a wireless instrument can be received only by an instrument tuned to waves of the same length. Heat, light and electricity are all forms of wave motion, and Marconi says that it will be only a step further when we shall have wireless light, heat and electric power.

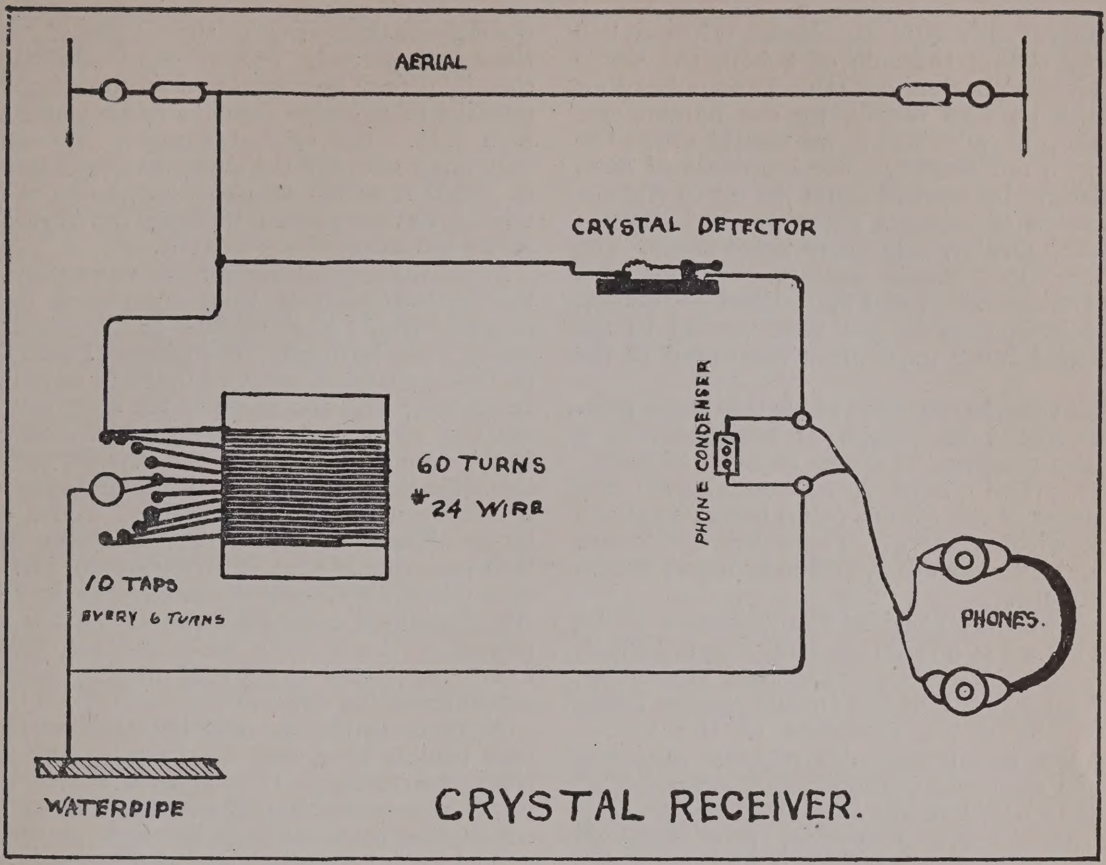


On the right is shown one of the earlier "wireless" stations. The vibrations of the waves from the sending instrument are carried up into the air on these wires and go out from them in all directions. Incoming waves are caught by the wires and carried down to the receiving instrument.

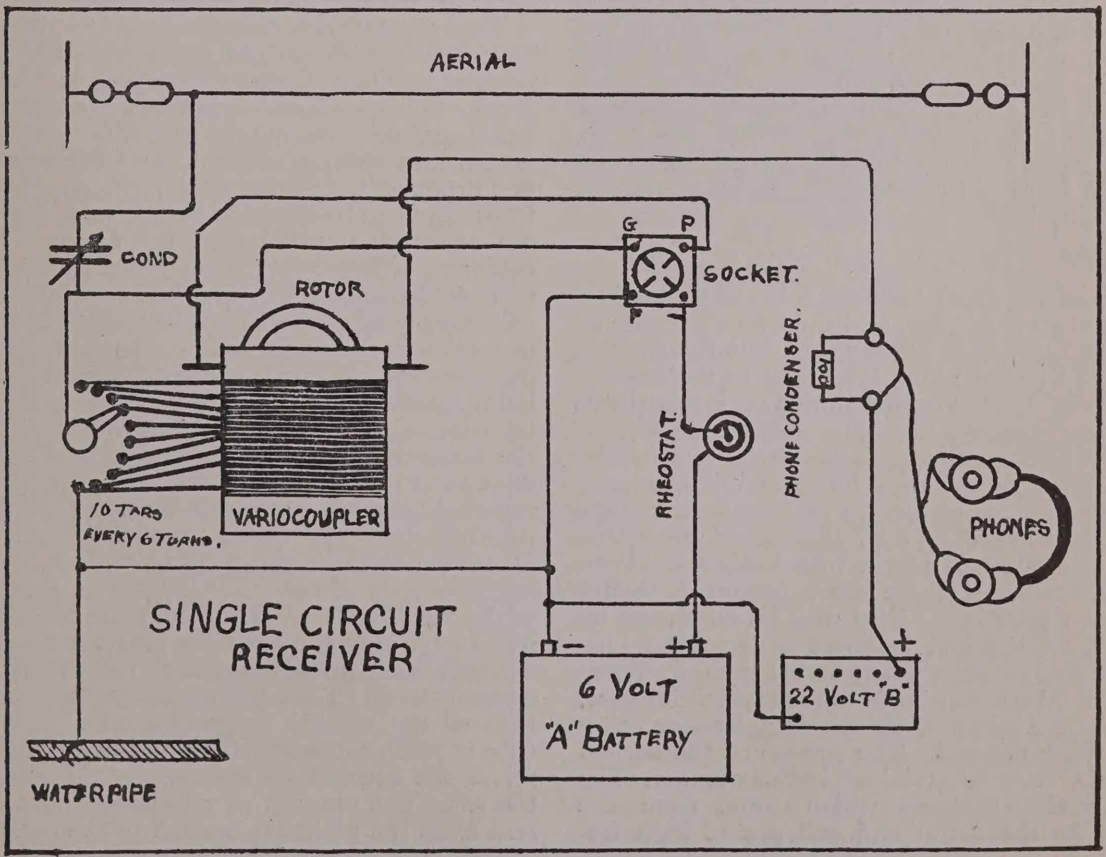


This is the inside of a Marconi station. The wires shown in the picture of the station above carry the messages down, where they are received by these instruments.

TWO SIMPLE RADIO TELEPHONY RECEIVING SETS


AERIAL
CRYSTAL DETECTOR
60 TURNS
#24 WIRE
10 TAPS
EVERY 6 TURNS
PHONE CONDENSER
.001
PHONES.
WATERPIPE

CRYSTAL RECEIVER.


AERIAL
COND
ROTOR
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F
F
SOCKET.
PHONE CONDENSER.
.001
RHEOSTAT.
PHONES
10 TAPS
EVERY 6 TURNS.
VARIOCOUPLER
6 VOLT
"A" BATTERY
22 VOLT "B"
+
−
+
WATERPIPE

SINGLE CIRCUIT RECEIVER

the shore with mild lappings. When a bell clapper strikes the side of a bell, the whole bell vibrates back and forth. These vibrations can not be seen readily by the human eye, but they may be felt if we should touch the bell with our fingers. The hundreds of little oscillations by the bell cause the air to vibrate in a series of motions somewhat like the ripples of the water, only many times faster. The air vibrations knock against our eardrums, called tympanums, and start them oscillating. These little motions are then carried to the brain and cause us to hear the sound of the bell.

Radio works on somewhat the same principle. Music or speech is sounded into a specially constructed phone at a broadcasting station. The phone is so constructed that vibrations of the sounds cause little vibrations of electrical current. These vibrations are sent out into the ether, and may travel thousands of miles.

Now we may consider the first part of the receiving set of a radio outfit, the aerial, which is a wire or a series of wires that attract the electrical waves sent out by the station transmitter. With the exception of the lead-in wire, the aerial must be entirely insulated from all electrical conducting materials. Porcelain and rubber are good insulators. Outdoor aerials are preferable, providing the entire or "overall" length is not over one hundred and fifty feet from the receiving set. However, interior aerials are very satisfactory, and may be made by running a wire near the ceiling or in a hallway; or certain forms of aerials may be purchased which will stand on a table. If there are any power lines in the vicinity your aerial must be at approximately right angles to them; otherwise induced current may be the result. It is the function of the aerial to catch the continuous waves from the sending station and transmit them, by means of a lead wire, to the set.

THE CRYSTAL RECEIVING SET

There are many different ways of connecting a radio receiving set, and the sets vary greatly in the number of parts used. But the general physical and working laws may be understood better by the novice if a simple set is described. Diagram number one illustrates such a set.

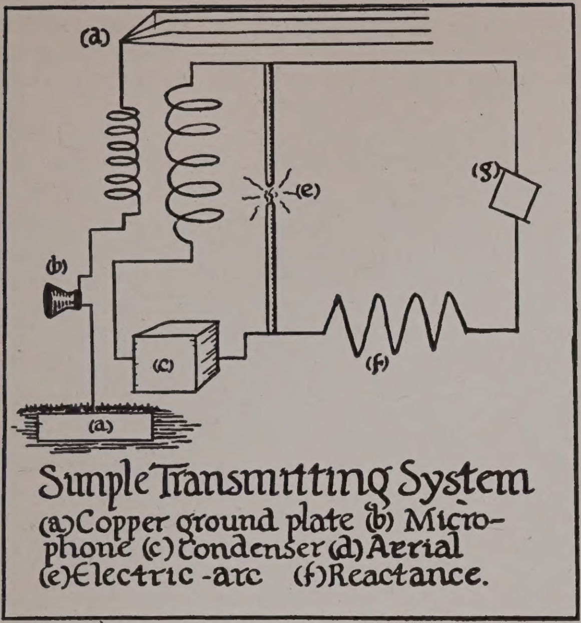
The lead-in wire from the aerial is attached to a coil. A coil may be made by wrapping insulated wiring about a non-conducting core such as an oatmeal box. The other end of the coil is grounded; i.e., a wire leads from it to the ground. If there are radiators or water pipes in your home they may be employed by attaching the coil lead-out wire to the pipe instead of running a wire to the ground. From the coil also a wire leads to the crystal detector, which is a piece of silicon or galena or other rectifying mineral. The service of the crystal detector may be explained in this manner. The electrical vibrations which come from the ether to the aerial and coil are of high frequency—making many thousands of vibrations each second. The current is alternating; that is, it may be considered as changing from positive to negative (plus to minus) at a very high rate. The crystal detector will permit only one variety of the current to pass through it. Thus it serves as a rectifier; and the electricity, having passed through the crystal, is called pulsating direct current.

From the crystal the current passes through the receiver and is then conducted to the ground wire. A telephone or telegraph receiver may be used. The physical principles of this apparatus may be quickly explained. In passing into the receiver the electrical current is conducted through a coil, through which runs a core which the current magnetizes. Since the current is pulsating, the core becomes an intermittent magnet whose oscillating charges vibrate a tympanum or drum. The principle is seen with the eye in the case of a vibrating clapper of an electric door bell. Air vibrations caused by the oscillating tympanum of the receiver enter the ear, and we have reproduced the sound practically as it emanated miles away.

A phone condenser may be attached to the wire leading into, and the wire leading away from, the receiver. It is generally a series of metal plates which are separated by a non-conducting material such as mica, air, paper, and so forth. Its effect is to prevent any stray vibrations, "unsmoothed" by the crystal, from entering the receiver.

THE ONE-TUBE RECEIVING SET

The crystal set described above is very limited in its scope, and will catch only local programs. The average practical set has a more complicated coil apparatus consisting of a primary and a secondary coil. The secondary receives an induced current from the primary and produces a stronger effect. Fainter vibrations than can be detected by a crystal rectifier are received and enlarged by vacuum tube detectors. Some sets have several primary and secondary coils, several vacuum tube detectors, and several condensers. The vacuum tube detector is built somewhat on the principle of the incandescent electric light bulb. In the center is a filament that is lighted by what is termed the "A" battery. About the filament is wound a threadlike grid, which does not touch the filament. The grid is surrounded, though not connected, by a plate. Another battery, called the "B" battery places a positive charge on this plate. The negative pole of the "B" battery is attached to the "A" battery. Since the plate is charged positively, only the negative ions are received through the non-conducting spaces of the vacuum tube. Thus the effect is the same as that of the crystal detector except that the tube is much more sensitive, and the vibratory forces are assisted by the current supplied in the set. The charges of pulsating direct current from the plate are carried to the receiver.



Simple Transmitting System
(a) Copper ground plate (b) Microphone (c) Condenser (d) Aerial (e) Electric-arc (f) Reactance.

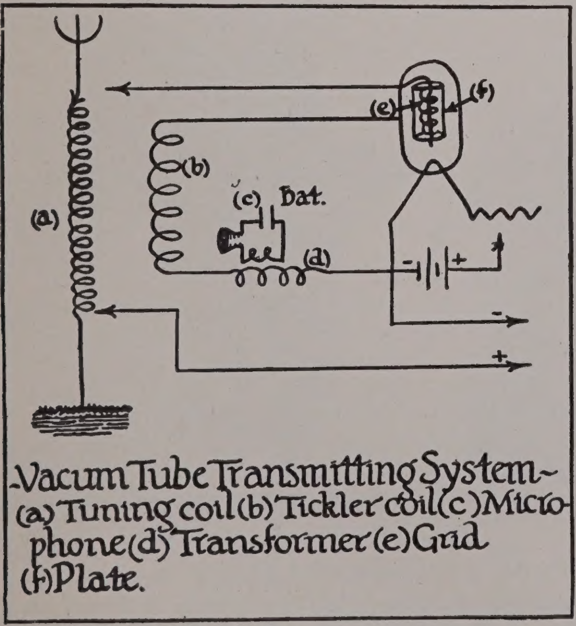
Fig. 1

RADIO BROADCASTING APPARATUS

Broadcasting stations are equipped with apparatus producing continuous waves of certain meter lengths. Most stations are assigned a definite wave length between 220 and 360 meters. A certain length is assigned each station so as not to cause wave-interference in the receiving sets.

Now suppose you are going to talk into a broadcasting apparatus. The machine is so fixed that your voice affects the continuous waves of a certain length being sent out at your station. The variation in the waves is detected by the receiving sets in many homes, and is converted into sounds and words.

The principle may be best explained by considering the action in Figure 1. You speak into the carbon microphone of the aerial-ground circuit. Your voice vibrates the diaphragm of the microphone. When the vibration pushes the diaphragm inward, the carbon granules behind it are packed more closely together, so there is less resistance of the current flowing between the ground and the aerial. Thus the inward vibrations permit a more ample oscillating current to proceed to the aerial; the outward vibrations less current. The current is generated by a dynamo; the vibrations which you modify are produced by the arc, induction taking place between the two parallel coils of the two circuits.



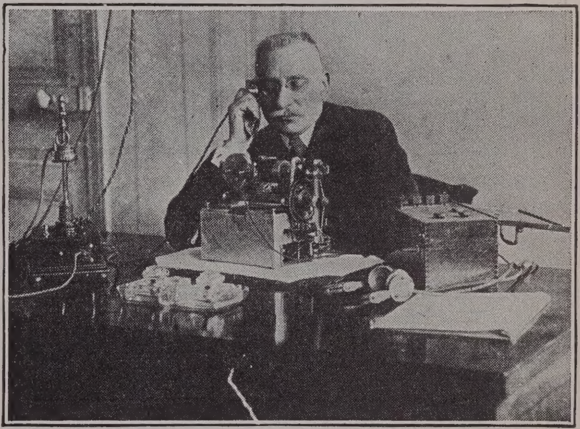
Vacum Tube Transmitting System—
(a) Tuning coil (b) Tickler coil (c) Microphone (d) Transformer (e) Grid (f) Plate.

Fig. 2

Broadcasting stations use the vacuum tube transmitting sets because of their high efficiency. The same principle of modulating or changing the continuous waves is used.

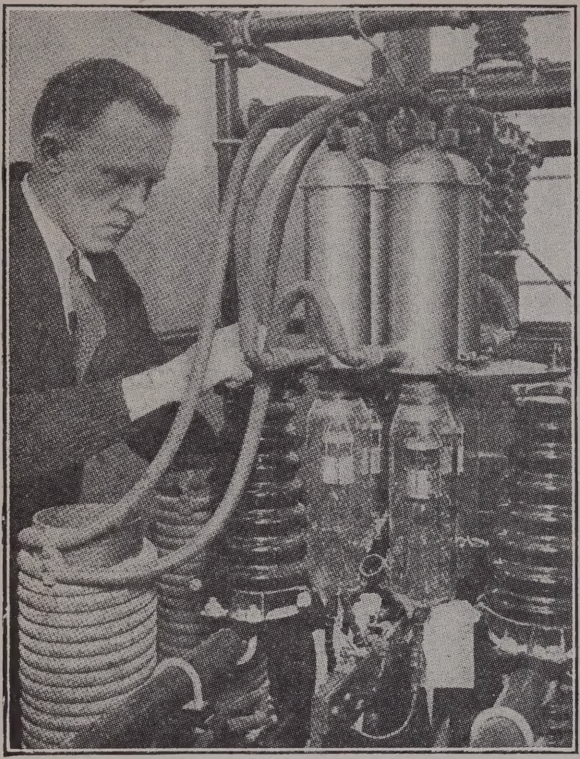
TRANSMISSION OF PHOTOGRAPHS BY TELEPHONE

Early in 1924 The American Telephone and Telegraph Company's research department developed an apparatus which will transmit photographs over electric wires. The machine in part consists of a photo-electric cell covered with an alkali metal sensitive to light. The greater the intensity of light falling on this cell, the more electric current the cell generates. Now suppose a photograph has been taken on a film. The light parts of the object on the exposed, developed film represent the dark parts of the original object—thus the film is called "negative." From this film another film is taken, with the result that the second film is called "positive," because the light parts of the positive film represent the light parts of the original object. The positive film is inserted between a beam of light and the photo-electric cell. Since the amount of current generated by the cell is determined by the amount of light falling on it, the cell sends out varying amounts of current as the lighter and darker parts of the film pass between it and the light. The current from the cell is amplified for sending, though of course the same variation of strengths is maintained. At the receiving end is an apparatus holding an unexposed film revolving at the



TRANSMITTING PHOTOS BY TELEPHONE

same rate of speed as the exposed film of the transmitting apparatus. The current coming over the wire regulates the intensities of light falling on the unexposed film—the greater the current, the less the light. The result is a negative film made at the receiving end.



Herbert News

THE BEATING HEART OF WJZ

In the center of the picture are some of the 10,000-watt tubes of one of the most powerful radio broadcasting stations in the world. Note the great insulators on each side of the tubes. At the top of the tubes are the water-jackets used for cooling, running water being conducted through the rubber hose.

PHOTOGRAPHS BY RADIO

The "radiophotogram" was invented in 1924. Its essential feature is the photo-electric cell. This is a tube coated on the inner surface with potassium and filled with argon. This tube is placed in an electrically charged field so that the potassium atoms are nearly at the point of throwing off electrical charges called electrons. A beam of light is sufficient to cause the atoms to eject electrons, producing a current. When sending a picture, a cylindrical film is placed under a strong beam of light 1/128 of an inch in diameter, and rotated so that the stationary beam makes hundreds of narrow parallel strips across the film, one at a time. Through the film, the beam enters the photo-electric cell. The varying degrees of lightness and darkness of the film affect the amount of light entering the cell, and the amount of electricity generated each second. When the amount of electricity reaches a certain point, the cell discharges. The greater the light, the more frequent the discharge. These electrical charges are stepped up and sent through space to the receiving station, where they guide the photographing of a new film, or the movement of a pencil.

RADIO AND THE GOVERNMENT

The radio industry has grown so fast it has become necessary for governments to license broadcasting stations and assign a certain wave length to each so that there will be no interference.

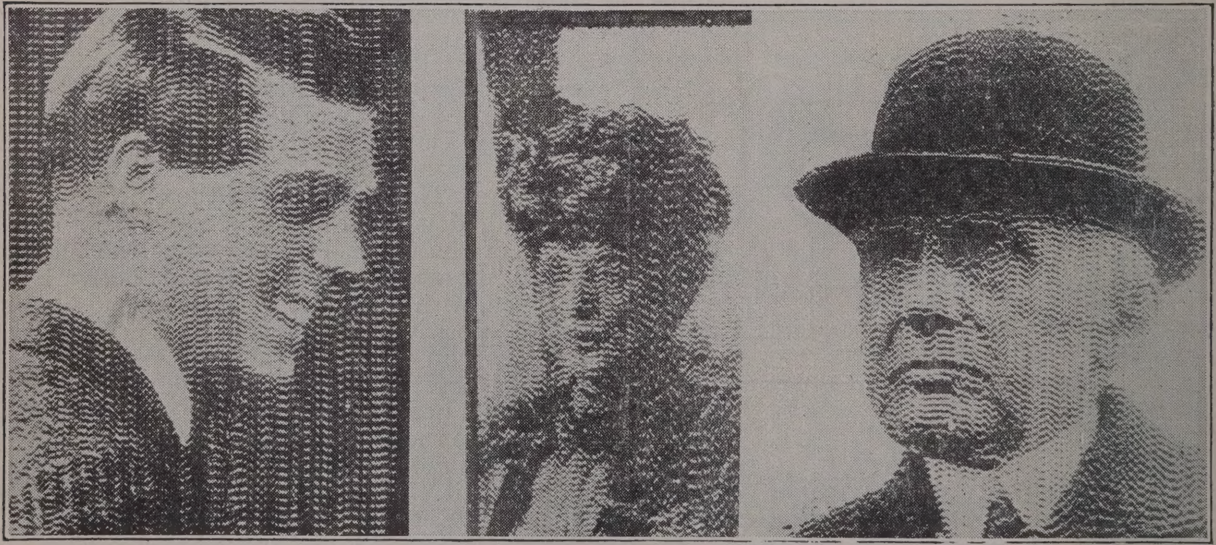


Photo by Underwood & Underwood, New York

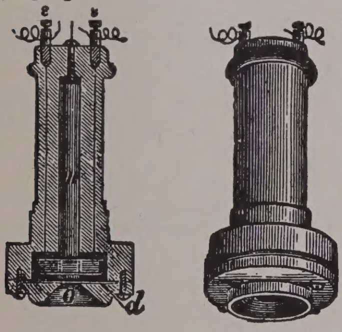
THESE PICTURES WERE RECEIVED BY RADIO FROM LONDON

S/371,773 A combination photo of three of the pictures which were transmitted from London to New York by radio, in an astounding demonstration by the Radio Corporation of America: The Prince of Wales; the Dowager Queen Alexandra of England and U. S. Ambassador Frank B. Kellogg.

Telep'athy, a term used to cover all cases of impression received at a distance without the normal operation of the recognized sense-organs. It is based on the theory that two minds can communicate independently of the physical body. The subject has been so entangled with clairvoyancy and "fake" forms of hypnotism, that much so-called telepathy is unscientific. But it has been scientifically studied since 1882. The mind initiating the process is the agent, and the other mind the percipient. A common form of the experiment is for the agent to draw a geometrical figure on a card and the percipient, who can neither see, hear, taste, touch nor smell what is being done, reproduces the figure. Prof. Crookes suggests that the process may be one of transference of intense thought by inconceivably minute and rapid ether-waves. Other popular manifestations are the performances of test-mediums and apparitions of a person to some distant friend at the time of the person's death. The verdict of science, however, still is: "Not proven."

Telepathy is not to be confused with Spiritualism, a religious belief. Those who practise telepathy are not Spiritualists. Some Spiritualists believe in communication of the living with the dead, but not through ordinary telepathy.

Tel'ephone, an instrument for reproducing speech at a distance from its source. Perhaps the simplest solution of this problem is to connect two stretched membranes by a stretched string. The pulsations of the human voice near one membrane will set it into vibration; while the string will transmit these vibrations to the second membrane, which by its vibrations reproduces the original sound for a listening ear. This is the so-called mechanical or acoustic telephone; but it is limited to such short distances — less than a mile — that we shall not discuss it.



BELL TELEPHONE

The first electric telephone was undoubtedly invented by Philip Reis in Germany in 1861. To him we owe also the name.

Reis' instrument, like all others of this class, consisted of three parts: one which transmitted the message; the line or wire over which the message was carried; and a receiver which finally transformed the message into sound-waves for the listening ear. His transmitter was very simple, being merely a diaphragm carrying a metallic point which alternately made and broke an electric current when the diaphragm was set in vibration by the human voice. The line was an ordinary metallic wire. The receiver was an electromagnet mounted on a sounding-box. As the iron core of the magnet was alternately magnetized and demagnetized, it emitted a sound — the well-known Page effect, discovered by Dr. Page, an American, in 1837. In this manner Reis was able to transmit the proper *pitch* and *intensity;* but he was totally unable to convey the correct *quality.* (See ACOUSTICS for the three distinguishing features of a sound.) The proper method of transmitting the true quality of a note is the joint discovery of the late Elisha Gray and of Graham Bell.

The essential point in the solution — and, therefore, the essential discovery of these gentlemen — is the use of *continuous* electric currents instead of the *interrupted* ones employed by Reis.

The instrument which Bell patented and perfected, in universal use to-day as a receiver, consists of a soft-iron diaphragm, held by its periphery, in front of an electromagnet. When an electric current, even a very minute one, is passed through the coil of the electromagnet, the iron disk is attracted. If the current is a pulsating one, the disk is set into forced vibration, accurately following the variations of the current.

In figure 1 the diaphragm is shown at D and the electromagnet at A. The line wires which convey the message to the receiver are attached at E.

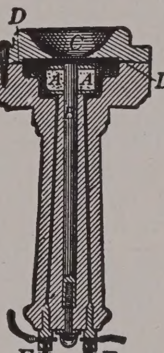


FIG. 1

For a transmitter, a microphone of the carbon type is almost universally employed. Two forms are in very common use: one, the Blake transmitter, is made up of a piece of gas carbon resting against a platinum pin; the other, devised by Henning, consists of a layer of hard carbon granules. The accompanying diagram, figure 2, shows at D the diaphragm which is set in vibration by the human voice. Between the carbon blocks, B and E, are placed the carbon granules

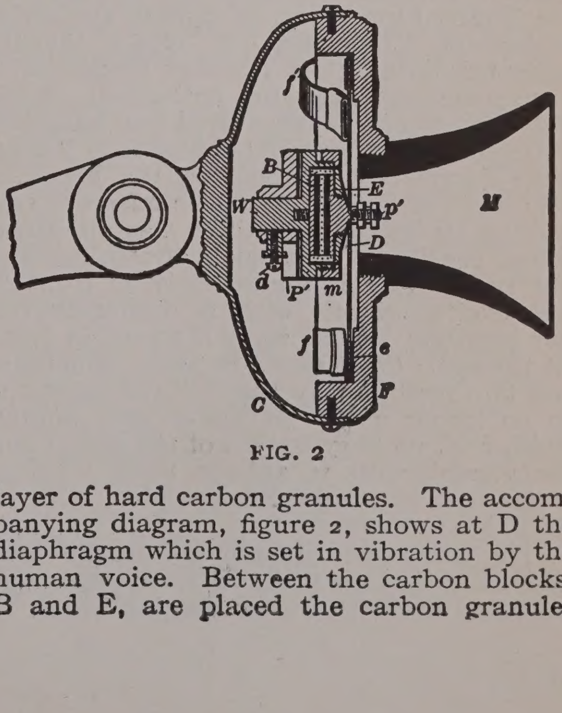


FIG. 2

which act as a microphone. See MICROPHONE.

Of much practical value, owing to the amount of business transacted over telephones which it is desirable to accurately record, is the Edison (*q. v.*) telescribe; a phonograph (*q. v.*) attachment for telephones, patented in 1915.

Television. "Sight at a distance," used as a method of transmitting at the same time a voice and a picture of the person speaking. Television was publicly demonstrated for the first time April 7, 1927, when Secretary of Commerce Hoover, in Washington, spoke with Walter S. Gifford, president of the American Telephone and Telegraph Company, in New York. Mr. Hoover appeared on a screen like a photograph come to life.

Dr. Herbert E. Ives and a group of associates, of the Bell Telephone Laboratories, are responsible for the accomplishment. To television a subject, he is placed before a square-shaped box and an automatic arc-light is turned on. A rotating disk with fifty holes arranged in a spiral is before the light. Fifty tiny rays of light successively sweep over the subject to be televisioned, 18 times a second. In one second 45,000 units are made. Varying brightnesses are reflected from the face corresponding to the lights and shadows of the face. This reflected light is received by a photo-electric cell, which converts light into electric energy. Variations of intensity in electric current now correspond to the facial features. This current is amplified five quadrillion times and sent by wire or radio to the receiving station. The electric current is changed to light again when all the flashes are made to jump from wires to tinfoil through neon gas. Neon is instantly illuminated when an electric current passes through it. These flashes build up the face on a small screen. The process is very expensive.

Tel′escope, an instrument for viewing distant objects, was invented, apparently, by Franz Lippershey, a Dutch spectacle-maker at Middelburg, in 1608. Shortly after this date Galileo heard of Lippershey's instrument and made one for himself. With this instrument he discovered four satellites of Jupiter and the variable phases of Venus, thus completely establishing the heliocentric views of Copernicus. The telescope employed by Galileo essentially was an opera-glass, consisting of a small double-concave (or negative) lens immediately in front of the eye, combined with a double-convex (or positive) lens at some dis ance in front of the eye. (See OPERA-GLASS). But there are two reasons why the Galilean telescope is no longer used: It has a very limited field, *i. e.*, no large extent of the object can be viewed with it at one time. (2) One cannot use a micrometer eye-piece with it. (See MICROMETER.)

The telescope almost universally employed in modern times is the astronomical telescope made of two converging lenses, as shown in Fig. 1. Let it be borne in mind that the purpose of the telescope is twofold: To gather a large amount of light into a small bundle of rays, so that these can all enter the pupil of the eye and thus make any luminous point appear much brighter than it would to the unaided eye; (2) to magnify the angle subtended by two luminous points and thus make them appear farther apart than when seen by the naked eye. How the first purpose is accomplished will be evident from Fig. 1, where wf_1 indicates the plane wave-front of the light coming from a distant star. The effect of the object-lens, L, is to convert this parallel bundle of rays into a conical bundle, having its apex or focus at F. The light leaving F is collected by the eye-lens, E, and converted again into a parallel beam, wf_4, which is small enough, say $\frac{1}{5}$ of an inch, to enter tne pupil of the eye. In this way nearly all the light which falls on the objective is made to enter the eye, making the star appear much brighter through the telescope than without it. How the second purpose of the telescope is accomplished will be clear from Fig. 2, which is the same as Fig. 1, except that it shows light coming from two distant stars, say a double star. Each star will send a beam of parallel rays to the objective, L. But the two beams of parallel rays which emerge from the eye-lens make a much larger angle with each other than do the two beams of parallel rays which enter the objective. The telescope thus magnifies the angular distance between two stars. Since the human eye cannot distinguish two points as separate unless they subtend an angle of two minutes, the telescope enables us to recognize many stars as double when to the naked eye they appear as single.

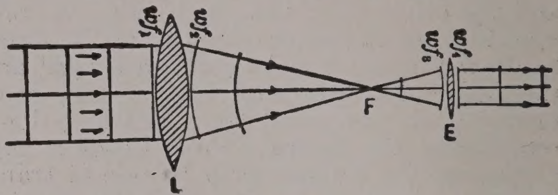


FIG. 1

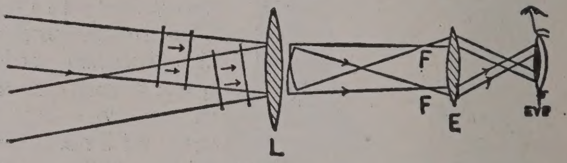


FIG. 2

The magnifying power of a telescope is numerically equal to the ratio of the diameters of the incident and emergent beams.

The best specimens of the astronomical telescope in existence are the 36-inch glass of Lick Observatory and the 40-inch glass of Yerkes Observatory, both made by the late Alvan G. Clark. On good nights these instruments permit the use of a magnifying power of from 2,000 to 3,000.

The reflecting telescope is little used and can therefore not be discussed within the limits of this article. Since, however, the reflector is interesting from a historical point of view, the student will do well to consult chapter vi. of Miss Clerke's *History of Astronomy.*

Teleutospore (*tē-lū'tō-spōr*) (in plants), a peculiar asexual spore which is developed by the rusts, which are parasitic fungi. Wheat-rust is a common example. The name refers to the fact that these spores are the last spores of the season which appear on the mycelium. As they must endure through the winter, they have very heavy walls and hence they usually are very dark to completely black. Often they are called winter-spores. In wheat-rust the teleutospores form the so-called black rust which appears on the stubble. See ÆCIDIOMYCETES.

Tell, William, according to Swiss story, was a patriot who in the 14th century rescued his native district from the tyranny of Austria. Albert I of Austria was trying to annex the forest-cantons, and was represented there by his bailiff, Gessler, whose rule was very cruel. Among other acts of tyranny Gessler placed the ducal hat of Austria on top of a long pole in the market-place of Altdorf, and gave orders that no one should pass without uncovering his head. Tell and his little boy one day took no notice of the hat and were dragged before the bailiff. Knowing Tell's reputation as a crossbowman, Gessler ordered him to shoot an apple from his son's head, and told him that if he missed it he should die. To the wonder of all, he hit the apple without injuring the boy. But Gessler noticed a second arrow in the bowman's girdle, and asked what he had meant to do with it. "To have shot you, had I killed my son" was the answer. He was at once seized, but escaped on his way to prison, and soon after shot Gessler through the heart. Then followed the great war of the Swiss against Austria, lasting from 1307 to 1499. Tell is said to have been drowned in 1350 while trying to save a friend during a great flood in Schachen River. In 1387 Tell's chapel was built in his memory. How much of this famous story of Tell is true is not known. Schiller used the story in his drama of *William Tell.*

Tel'ler, Henry Moore, United States senator, lawyer and Republican politician, was born at Granger, Allegany County, N. Y., May 23, 1830, and educated at Rushford Academy and Alfred University (LL.D. 1886). On studying law and being admitted to the bar, he practiced in Illinois, then removed to Colorado, where he was elected to the United States senate, and was secretary of the interior in President Arthur's cabinet (1882-5). Since 1885 he has continued to represent his state in the United States senate, but is now politically a Democrat, having in 1896 withdrawn from the national Republican convention at St. Louis in that year in consequence of the financial plank in its platform adverse to free silver.

Temiskaming, Lake, on upper Ottawa River (Ontario), is attracting much attention. One million acres of excellent arable land have been surveyed and are open for settlement. The district is well watered by Blanche, Montreal and Wabbi Rivers and their tributaries. Thousands of settlers have already taken locations. Temiskaming Railway passes through the district. It runs through the rich silver-deposits of Cobalt (*q. v.*). The town of Cobalt is on the line. Haileybury, only three miles distant and situated on the lake, also is on the railway. The present terminus of the railway (government-owned) is Englehart, 138 miles from North Bay, on White River.

Tempe (*tĕm'pē*), **Vale of,** a narrow valley or gorge, about four and a half miles long, in the northeast of Thessaly, between Mounts Olympus and Ossa. The Peneus flows through it. The classic poets praise it for its matchless beauty, and travelers to-day speak of the wild grandeur of its scenery.

Tem'perance. See TOTAL ABSTINENCE.

Tem'perature. The following statements from Maxwell's classical volume on *The Theory of Heat* put the matter as clearly and concisely as, perhaps, is possible.

"Definition of Temperature.— *The temperature of a body is its thermal state considered with reference to its power of communicating heat to other bodies.*

Definition of Higher and Lower Temperature.—*If, when two bodies are placed in thermal communication, one of the bodies loses heat and the other gains heat, that body which gives out heat is said to have a higher temperature than that which receives heat from it.*

Corollary.—*If, when two bodies are placed in thermal communication, neither of them loses or gains heat, the two bodies are said to have equal temperatures or the same temperature.*

Law of Equal Temperatures.— *Bodies whose temperatures are equal to that of the same body themselves have equal temperatures.*" See THERMOMETER.

Tem'pest, The, a play by Shakespeare, was first acted in 1610. It seems to have been written for private performance, being a third shorter than his average plays. It has been suggested that its present form is an abridgement by Beaumont about 1613, for rendition at the wedding of Princess Elizabeth. It seems to be one of Shakespeare's latest works, first printed in the folio of 1623. Its sources principally are books of travel. It has no basis in the life of the times. Two characters, Caliban and Ariel, lie outside the bounds of humanity. The drama represents an enchanted world summoned into existence by the magician's wand and ready to disappear at his bidding. There is no strongly dramatic situation. Prospero is in full control; power and right, evenly paired, work together.

Tem'plars, Knights, a celebrated religious and military order, founded at Jerusalem in the beginning of the 12th century by Hugues de Paganes, Geoffrey St. Omer and seven other French knights for the protection of the Holy Sepulchre and the pilgrims who visited it. Baldwin II, king of Jerusalem, gave them their first home; and another building was obtained from the abbot of the church and convent of the temple, because of which they were called Templars. Each Templar was allowed three horses and an esquire. They obeyed strict rules, and at first were proud of their poverty. When the Saracens captured Jerusalem, the Templars spread over Europe; their bravery became celebrated everywhere; money and lands were showered on them; and members of the greatest families were proud to be enrolled in their number. In every country where they were they had their governor, called the Master of the Temple.

The Templars at first were all laymen and of noble birth. Pope Alexander III, however, in 1162, had chaplains taken into the order, who did not adopt the military vows; and laymen not of noble birth afterwards joined as serving-brothers, some attending the knights and some working at trades in the houses and on the lands of the order. Many also joined merely to gain the protection afforded them. As the Templars grew in power, they became luxurious, proud and independent of law and authority. Philip IV of France seized and imprisoned all the members of the order on whom he could lay hand, confiscated their lands, and put many to death for alleged crimes. The English Templars were treated by Edward II in much the same manner, except that their punishment was confined to the loss of their possessions to the king. In 1312 the order was finally suppressed by the council of Vienne, the greater part of their property being bestowed on the Knights of St. John.

The Templars' uniform was white, with a red maltese cross on the left shoulder. Their banner was white with black stripes, and was called *beauséant*, the name then given to a horse marked with black and white. *Beauséant* also became their battle-cry. See Addison's *History of the Knights Templars*.

Tem'ple, Tex., a city in Bell County, on the Gulf, Colo. and Santa Fé and the Mo., Kans. and Texas railways, 35 miles southwest of Waco and about 60 northeast of Austin. It has a Carnegie Library, and, besides its municipal buildings, churches and schools, also has the King's Daughters' Hospital and the Railroad Hospital of the Gulf Railroad. Settled in 1881, it was incorporated a city in 1884. Its industries are many and growing; they include flour and cottonseed-oil mills, cotton-gins and compresses, machine-shops, foundries, bottling-works, a cold-storage plant and a candy-factory. It ships extensively of live stock, besides fruit, corn, oats and cotton. Population 10,993.

Temple, Frederick, late Archbishop of Canterbury, was born in Leukas, in the Ionian Isles, in 1821; and died in London shortly after he had performed the ceremoney of the coronation of Edward VII. He was a distinguished graduate of Balliol College, Oxford. He was successful in turn as head of the Knellar Hall Training-School, as inspector of schools and as headmaster of Rugby. His essay in *Essays and Reviews* was regarded by some as more liberal than orthodox. In 1869 he became Bishop of Exeter, in 1885 Bishop of London and in 1896 Archbishop of Canterbury. Temple was an orthodox prelate, a learned writer and a man of the highest character.

Temple of Karnak, The kings of the new empire put all their energy into building temples rather than palaces. The ruins of this period are scattered about Thebes over an area of 2¼ miles north and south and 3½ east and west. The most important and magnificent group is at Karnak on the right side of the Nile. It consists of one principal temple and five or six smaller ones arranged loosely about it, with seemingly little or no regard for symmetry. All the temples of this period were very similar in construction, having an inner sanctuary or *sekos*, a hall of assembly containing two ranges of large columns in the center and one or more rows of smaller ones on the outer side of the central columns. Light was admitted over the lateral columns (this is called a hypostyle hall); sometimes light was admitted over low stone-screens between the columns of the front row of the hypostyle; in such a case all columns were of equal height. In front was a large forecourt, surrounded by a row of columns at the entrance of which was a double pylon or gate, formed like an oblong, truncated pyramid with flaring cornices, masts and banners and iron stocks for blazing torches in the night. Colossi of seated figures hewn in stone usually decorated the front. The building began with the erection of the *sekos* or sanctuary which was to contain the shrine of the deity and the sacred chamber. Rooms for the priests and the performance of various rites and ceremonies were adjoining. Karnak is the greatest and most important of all the temple-palaces, for such in reality they were, being built by the king for the worship of the god and also for royal ceremonies and festivities. "The temple of Karnak perhaps is the noblest effort of architectural magnificence ever produced by the hand of man." (J. Fergusson.) Its construction extended over 2,000 years and was the work of 21 kings. It is 1,200 feet long and about 360 in width, the great hypostyle hall being 340 ft. by 170 ft. The sanctuary or inner part was originally built by Osortasen (12th dynasty). Amenophis (the first of the restored race) enclosed it in a greater temple measuring 120 feet square. In front of this Thothmes built a magnificent hall backed by piers and surrounded by colossal statues Back of it Thothmes III erected a peculiar building in comparison with the rest, 140 feet long and 55 feet wide. It consisted of two rows of massive, square columns which supported the roof on the outer sides while in the center the roof was raised and supported by taller but circular columns with reversed capitals. This is similar to the buildings of Assyria but quite unlike Egyptian ones. The progress of construction was brought to a standstill by the sun-worshippers in the 18th dynasty, but was resumed by Menephthah who started the great hall, "the masterpiece of Thebes." It covered 59,500 square feet, and contained 150 columns 8 to 10 feet in diameter, ending in a capital of flowering lotuses and rich in colored design.

Rhamses I of the 19th dynasty built a small temple in front of this, and the great court was added by the kings of the 22nd dynasty. The building was now complete as we find the plan of the whole in the ruins of to-day. There were 12 entrances to the temple, the most important of which were the one that opened to the boat-landing on the Nile at the northwest and the great gate on the south that gave access from the avenue, which was a mile and a half long and lined on each side with sphinxes, that connected with the temple of Luxor. But this gate was surpassed in grandeur by the former. From the boat-landing on the Nile, a mile distant, an imposing roadway of sphinxes led to the wall of the great court, connected with it by a court containing four obelisks and colossi of the king. The entrance to this was flanked by huge pylons of stone, 180 feet high and decorated with inscriptions, flat designs and sculpture in flat and in high relief. It was painted with brilliant oriental colors. Within this a row of columns led to a second pylon which formed a gateway or entrance to the great hypostyle hall, and was treated in the same manner as the former ones. Avenues of sphinxes led from similar gateways to the surrounding temples. Consult Jas. Fergusson: *History of Architecture;* C. T. Matthews: *The Story of Architecture;* and Perrot and Chipiez: *History of Art in Ancient Egypt.*

Temple of Luxor, The, is next in beauty and importance to Karnak and is in its vicinity. Being built very near the Nile may account for its destruction; yet it may not have been finished. It is ruined, and the materials have been carried away. The utter disregard the Egyptians had for regularity and symmetry is plainly to be seen in this temple. There is a considerable angle in the axis of the whole structure, and right angles in the angles of the court-yards are rare. The columns are irregularly spaced, an irregularity which seems to have vitiated their whole scheme of building. It is 830 feet long, has a width varying from 100 to 200 feet, and is much simpler than Karnak, being built by only two kings, Amenophis III erecting the southern part containing the sanctuary, royal apartments etc., and Rhamses the Great, the northern part, consisting of a large fore-court deflecting from the major axis of the building and facing the temple of Karnak, with which it was connected. A large hall adjoining this and similar to the hypostyle hall at Karnak is attributed to the latter king. The floor of this hall is raised a few feet above that of the court and is reached by a flight of steps. In front of the huge pylon at the entrance of the great court are two colossi of Rhamses the Great, and two obelisks formerly were there also.

Ten′dril, an organ developed by many climbing plants as a holdfast. Tendrils may be modified branches, leaves or parts of leaves. In every case they are very sensitive, and have the power of rapid coiling or contraction when they come in contact with a support. In the grape-vine, when the tendrils reach a support, they coil about it, and growing unequally are thrown into spirals, thus drawing the vine toward the support. Sometimes a tendril has a sucker-like disk at its tip. When the disk becomes fastened to a support, the straight tendril becomes a spiral, and the plant is drawn toward the support. The stimulus which calls forth this response of the tendril is known as the contact stimulus.

Ten′ements. A tenement, properly, is any house constructed for the separate living of more than one family; but the term usually is applied only to the poorer classes of apartment-houses. In our large cities millions dwell in such houses under dreadful conditions. Our country is especially liable to the evil, because deluged with immigrants of a low standard of living and because slow to interfere by laws with the greed and wickedness of individuals. In consequence, while in the rest of the world the densest population occurs in some parts of Bombay, where 750 Hindus crowd on a single acre, and in New York City, in one section where 1,000 men, women and children are herded on one acre. In the worst part of the slums of London the proportion is but 365 to an acre. The time to prevent overcrowding is when the city is building, and suburban lots can be secured with comparative cheapness. The results of such overcrowding are disease, immorality and loss of efficiency, as well as mere misery. During 1894-1903 there were about 500 cases of tuberculosis from one city block occupied by 4,000 people. The history of one room shows that, shut out from the healthy action of light, the dreaded disease had spread to family after family. Four times as many children die in these houses as in the average. In Berlin it was found that the death-rate (1885), for families that live in one room was 163 per thousand, but for those that have four rooms or more, only 5.4 per thousand. Families living together in one room lose their sense of decency, and the children are driven to the streets on hot nights to escape the room. Children grow up with impaired vitality and impoverished minds.

The remedies for such conditions are, first, wise land-laws to keep people from crowding to the towns, advancing money to intending farmers and educating boys and girls to live in the country; second, to improve town-buildings and improve the means of getting from the suburbs to the places of work. England has done much to cheapen suburban travel. London has spent over £2,000,000 ($10,000,000), to build cottages for workmen and buy and rebuild badly constructed districts. Glasgow has rebuilt over eighty-three acres, and thereby reduced the death-rate to a fourth of what it was. The city has repaid itself out of the rents, and improving the public health has enriched the public purse. In Berlin the laws are compelling landlords to build decent houses, and make the burden of taxation lightest on houses fit for workingmen. In Belgium the fare on suburban railroads has been reduced so as to enable a workman to travel cheaply to his labors each day. In Italy workmen are encouraged to build their own houses by a remission of taxes for five years on such houses. In New York several tenement districts have been purchased and turned into parks and playgrounds and schools. Several laws as to tenements have been passed by the State, and New York City has a special department to deal with tenements. Following an English example, Alfred T. White in 1877 developed model dwellings for workingmen, and received seven and one-half per cent on his investment. Other attempts of this kind have been made with success; but the immediate relief that would come from holding landlords responsible, from proper inspection and from swift correction of the evils, no American city has yet experienced.

In 1934, the National Housing Act was passed and became one of the most important accomplishments of the New Deal Administration introduced by Franklin Delano Roosevelt. The reasons for the Act were based on the following statistics: the nation was at least 800,000 houses short for the five preceding years; normally 400,000 houses are built in a year, but in 1933 there were only 50,000 built; it was estimated by the NRA that sixty-two per cent of the existing houses need repairs; approximately 3,500,000 of the unemployed were normally employed directly on construction, and 5,000,000 more indirectly; of the 30,000,000 families in the United States, it was estimated that 4,000,000 have combined since 1929, which meant that 2,000,000 new houses are needed. Federal agencies estimated that 3,000,000 families were living in slums unfit for habitation, and the United States Chamber of Commerce estimated that 50,000,000 persons were housed in homes either insanitary or undesirable.

The National Housing Act was designed to renovate and modernize homes through easy credit facilities, and especially to stimulate employment in the building trades and durable-goods industries, and to complete the program of the Government for a thorough reorganization of home mortgages, for relief of defaulted mortgages and of lending institutions carrying heavy burdens due to frozen home mortgages. All initiative, however, was in the hands of private enterprise and the home owner. The Government guaranteed certain proportions of loans and eased the general situation, but did not enter the housing business, nor provide for large-scale housing plans or a national unified scheme of planning.

The four major provisions of the Act launched a modernization and home-improvement campaign whereby home owners might borrow up to $2,000 at low interest rates; established mutual mortgage-insurance associations to insure mortgages on existing or newly completed homes up to eighty per cent of their appraised value; provided for the setting up under Federal charter of privately owned and operated mortgage associations for low-cost long-term home financing, and insured shares and certificates of sound building and loan associations.

Tenerife (*tĕn-ĕr-ĭf'*). See Canaries; Spain.

Teniers (*tĕn'yĕrz*), **David**, The Younger, a celebrated Flemish painter, was born at Antwerp in 1610. His father, also a well-known painter, gave him his first lessons in art. He soon showed a genius greater than his father's but in the same line, as a colorist and painter of the scenes and incidents of ordinary country-life. He became the most popular of Flemish painters, and was kept busy to meet the demand for his pictures. The governor of the Spanish Netherlands made him gentleman of his bedchamber, and the king of Spain set apart a special gallery for his works. Among his paintings are *The Village Wedding; The Bagpipe-Player,* and *The Misers.* Teniers died near Brussels, on April 25, 1690.

Tennessee (*tĕn-ĕ-sē'*), "The Volunteer State," the third State admitted into the Union after the adoption of the Federal Constitution, is one of the east South Central group of States. It is bounded on the north by Kentucky and Virginia; on the east by North Carolina; on the south by Georgia, South Carolina, Alabama and Mississippi, and on the west by the Mississippi River separating Missouri and Arkansas from Tennessee. Its greatest length is 432 miles, its greatest breadth, 109 miles, and it extends over an area of 42,022 miles, with only 335 square miles of water surface. The origin of the name of the State is from the word "Tennese," which was the Indian name for the chief town of the Cherokees. This town was located on the Little Tennessee River.

Surface. Varying physical conditions divide Tennessee into sections. Western Tennessee reaches from the Mississippi to the Tennessee River; the middle section of the State stretches eastward to the middle of the Cumberland plateau; and eastern Tennessee occupies the remaining area of the State. Along the extreme eastern border extend the Appalachian Mountain Ranges including Unaka or Great Smoky Mountains, the Bald, Iron and Unico Mountains. The Unaka Range rises to an elevation of 5,000 feet and has several peaks with altitudes ranging over 6,000 feet. The highest of these are Clingmans Dome, 6,642 feet; Guyot, 6,621 feet; Leconte, 6,593 feet; Curtis, 6,568 feet, and Sadler, 6,535 feet. These mountains afford delightful summer resorts in the midst of beautiful scenery. At the extreme western boundary of the State extends a low gulf coastal plain along the river bottoms of alluvial soil, known locally as the Mississippi Bottoms. An abrupt bluff rises from here forming a rolling country which extends eastward to a ridge in the center of the State, where it slopes down to form the Tennessee River bed. The celebrated Lookout Mountain rises on the southern side of the Tennessee River near Chattanooga. Beyond this river valley rises the Highland Rim which is a rolling plateau broken up by smaller river valleys. From the Highland Rim rises the Cumberland Plateau, which overlooks the noted Limestone Basin. This area abounds in parallel ridges which have an elevation of more than 2,000 feet. Among the Cumberland Mountains are caverns many miles long, in which powerful underground streams flow and bones of extinct animals lie buried. There are also mysterious sink holes through which the waters drain into underground streams. The chief rivers of the State are the Tennessee, which crosses the State twice, the Cumberland, the Holston, the Clinch, the French Broad and the Big Hatchie.

Climate. The climate of Tennessee is very pleasant with little variation as to temperatures. In the mountains of the East a cool climate prevails. The mean annual temperature ranges from fifty-seven degrees in the east to sixty degrees in the west. During the winter season the temperature averages about thirty-eight degrees; in the summer months an average from sixty-two to seventy-eight degrees is attained, depending upon the section of the State. The annual average rainfall amounts to fifty inches.

Minerals. The mineral resources of Tennessee are very valuable. The coal fields found in the Cumberland Plateau region spread over an area of over 4,000 square miles and constitute the most valuable mineral product of the State. There are nearly 200 coal mines and 2,000 coke ovens, the coke being shipped and used in the iron furnaces in the forty-four scattered counties of the State. In 1932 there were 3,240,000 net tons of iron produced. The chief iron ore mines are located near Knoxville and Chattanooga and in the Highland Rim west of Nashville. In 1932 there were 4,623 gross tons of iron mined. Copper ore is mined in the southeastern corner of the State. Smaller quantities of zinc, gold and silver are also found here. Large deposits of phosphate rock are found in central Tennessee, 182,000 gross tons being mined in 1932. In the eastern section of the State, an almost inexhaustible quantity of marble is quarried. This marble has been used abundantly for the inside casing of the United States Capitol and the Congressional Library Building in Washington, D. C. Other important minerals include aluminum ore, some of which is reduced in the State, lead, manganese, petroleum, natural gas, barytes, fluorspar, limestone, sandstone and clay products. The total value of mineral products in Tennessee in 1930, not including pig iron, amounted to $32,499,380.

Production and Industry. Approximately three-fifths of the inhabitants of the State are engaged in farming. Since 1850 three-fourths of the entire area of Tennessee is under cultivation. The improved acreage, however, has doubled since that date. Rich alluvial soils are found in the river valleys, with sandy areas on the Cumberland plateau. The most common soil of the State is clay which has resulted from the disintegrating of limestone. Corn is the principal crop. In 1932 the yield amounted to 59,418,000 bushels. Cotton is another of Tennessee's leading crops. There were 1,104,000 acres under cultivation, yielding 450,000 bales in 1932. Tobacco is grown chiefly northwest of Nashville. In 1932 the yield totalled 110,565,000 pounds. The winter wheat crop amounted to 2,584,000 bushels in that same year. Both sweet and Irish potatoes are raised in large quantities. Peanuts, apples, plums, peaches, pears, and strawberries are raised for shipment to the northern markets. Among the other crops under cultivation in the State are oats, rye, barley, hay, sorghum, peas, and nuts. Livestock in 1932 included 157,000 horses; 318,000 mules; 1,032,000 cattle including 600,000 milch cows; 393,000 sheep, and 1,075,000 hogs. In 1931, 1,400,000 pounds of wool were clipped. There were 245,657 farms in Tennessee in 1930 extending over 18,003,241 acres, 7,666,000 acres of which were under cultivation.

Tennessee has extensive forests. Conifers of almost all varieties abounding on the mountain ranges, while the remainder of the State, with the exception of the central portion which has been cleared, is heavily forested with hardwoods. The forests occupy an area of 30,000 square miles and are said to contain 140 species of trees. One-half billion feet of lumber is cut annually, consisting chiefly of yellow pine, oak, gum, yellow poplar, hemlock, chestnut, ash, and hickory.

The principal industries of Tennessee include iron and steel making, the manufacture of foundry and machine shop products, the preparation of leather and tobacco, flour and lumber mills and the manufacture of textiles, cottonseed oil and cake, and clay products. In 1932 the State had 545,542 active spindles in operation which consumed 140,120 bales of cotton. The United States census of manufacturers in 1929, reported 2,846 manufacturing establishments with 126,921 employés, who produced goods valued at $706,053,577.

Transportation. Several large trunk lines traverse the State to the terminal point of Memphis. In 1932 there were 3,940 miles of steam railway in the State, and 507 miles of electric railway. The Mississippi, Tennessee and Cumberland rivers form natural waterways with ports at Memphis, Nashville, Chattanooga and Knoxville. These rivers are navigable for their entire lengths within the State. Tennessee maintains 7,051 miles of highways, 5,897 miles of which are hard surfaced.

Population. In 1930 the population of Tennessee was 2,616,556, an increase of 11.9 per cent since the census returns of 1920. The population is distinctly rural although the urban population is increasing, being 34.3 per cent of the whole in 1930. Of the total population, only 0.5 per cent was foreign born whites, and 18.3 per cent Negroes. The chief cities, with their populations in 1930, are: Memphis, 253,143; Nashville, the capital, 153,866; Chattanooga, 119,798, and Knoxville, 105,802.

Education. Tennessee has an excellent and efficient school system. There exists a State Board of Education of nine members appointed by the Governor to serve six-year terms. The Superintendent of Public Instruction, who is also appointed by the Governor, serves a two-year term. Each county has a superintendent and the municipalities control their individual school systems. School attendance is compulsory for both white and negro children. In accord with the State law children under sixteen years of age may not be legally employed in workshops, mines or factories. The rate of illiteracy in 1930 amounted to 7.2 per cent of the inhabitants over ten years of age. This included 87,025 native whites, and 57,251 Negroes. During the school year 1931-32 there were 6,150 elementary schools with 562,387 pupils and 15,884 teachers; and 678 high schools with an enrollment of 68,697, and 3,293 teachers. The total expenditures for schools during this year was $24,183,405. The State maintains six normal schools, one of them for Negroes, which had a total of 6,465 students enrolled in 1931, with 225 instructors.

Tennessee is well equipped with twenty-six institutions for higher education, including the University of Knoxville. The University of Chattanooga, a Methodist institution, which was established in 1867, had an enrollment of 421 students in 1933. Among the other leading universities, with their enrollments in 1932-33, are Vanderbilt University, a nonsectarian institution which was established in 1875, 1,338 students; Maryville College, a Presbyterian school, established in 1819, 807 students; Cumberland University, a Presbyterian institution, established in 1842, 613 students; the University of the South, established in 1868, 241 students; and Fisk University for Negro students at Nashville, which was established in 1866, 449 students.

The University of Tennessee was founded in 1794 under the name of Blount College. The name was changed to East Tennessee University in 1806. It was not until 1879 that the present name was adopted. The medical and dental colleges are located in Memphis while the colleges of arts and sciences, law, commerce, engineering, agriculture and the graduate school are located on the campus in Knoxville. In 1932-33 there were 5,174 students enrolled with a faculty of 300. This institution is one of the largest State universities in the South. The Tennessee Polytechnic Institute, located at Cookeville, was founded in 1915 and is maintained by the State. The enrollment in 1932-33 was 942.

Government. The State of Tennessee has had three constitutions. The present Constitution was adopted in 1870. The General Assembly consists of two bodies, the Senate and the House of Representatives. There are thirty-three Senators and ninety-nine Representatives, all of whom are elected for two-year terms. No clergymen are eligible to hold office in the General Assembly. All amendments to the Constitution must be proposed and passed by a majority vote of both houses. A two-thirds vote of each house must then be obtained in the following legislature. Amendments must finally be ratified by a majority vote at a popular election. Only one amendment every six years may be proposed in the State legislature.

The executive department of State consists of the Governor, the Secretary of State, the Treasurer, the Comptroller, and the Attorney-General. The Governor is elected for a two-year term and may serve only six years out of a period of eight years.

Tennessee is represented in the National Congress by two Senators and nine Representatives.

History. De Soto was the first white man to visit the region now a part of Tennessee. In April, 1541, he reached the present site of Memphis on the Mississippi River. In 1673, the two Frenchmen, Joliet and Marquette, explored the country along the river. In 1682 La Salle built the Fort Prud'homme upon the site now occupied by Memphis. In 1714 the Frenchman Charleville established a trading post near the site of Nashville. Fort Assumption was founded by still another group of French settlers. A group of North Carolinians made a settlement in this region in 1754, a settlement which was destroyed at a later date by the Indians. Two years later Fort Loudon was built on the Tennessee, thirty miles from the site of Knoxville, by the English. The massacre of the garrison in 1760 was followed by the defeat of the Cherokee Indians and the Fort Stanwix treaty of 1768, which provided for further settlements. In 1769 the first permanent settlements were made on the Watauga and Holston Rivers, by colonists from North Carolina and Virginia. In 1772 the Watauga Association was organized, which became famous in the history of the State. In 1776 this Association was granted representation in the colonial assembly of North Carolina. The original Carolina grants made it a part of the State, known as the County of Washington.

During the American Revolutionary War the frontiersmen of Tennessee served the colonists most valiantly under John Sevier. The battle of King's Mountain, which was fought between the British and the colonists, proved a victory for the colonists. After the close of the war many immigrants settled in this territory. Tennessee was included in the grant of the Carolinas which was ceded to the United States by North Carolina in 1784. A portion of the territory organized under the name of Franklin or Frankland by dissatisfied frontiersmen of North Carolina flourished from 1784 until 1788, but was not recognized by the Federal Government. At a later date when North Carolina ceded the territory, the region south of the Ohio River was organized in 1790. In 1796 Tennessee drew up a constitution and was admitted to the Union. Tennessee has had many State capitals, among them Knoxville, Kingston, and Murfreesboro. Today the capital city is Nashville. During the War of 1812, Tennessee responded with 27,833 volunteers. The brunt of the Creek and Seminole Wars was borne by Tennessee soldiers. The United States Government asked for 2,800 volunteers from Tennessee in the Mexican War, and 30,000 men responded. Since that date Tennessee has been known as "The Volunteer State." The State was divided during the Civil War in its sympathy, the eastern section sending 31,092 men to the Union army, while the remainder of the State furnished 115,000 men to the Confederate Army. The State seceded from the Union on May 7, 1861, and many hard fought battles took place on Tennessee soil. Murfreesboro, Franklin, Nashville and Missionary Ridge mark the site of several important conflicts. The Battle of Lookout Mountain was fought above the clouds near the city of Chattanooga. Grant was forced to the river at Shiloh. Next to Virginia, the State was the leading battleground of the war.

A period of reconstruction was entered upon in 1865 and lasted until the State repudiated the Confederate war debt, ratified the Thirteenth and Fourteenth Amendments and adopted the strict "Test Oath" for voters. Tennessee was re-admitted to the Union on July 24, 1866. The Ku Klux Klan, reputed to have originated in the State in that same year, caused much lawlessness within the boundary of Tennessee and rapidly spread to other Southern States.

Tennessee River, one of the largest tributaries of the Ohio. The Church River, rising in southwestern Virginia, is joined at Kingston, Tennessee, by the Holston which has already received the waters of the French Broad River near Knoxville. The Tennessee River, formed by this confluence, then flows south, entering Alabama near Chattanooga, Tennessee, and turning north to re-enter Tennessee at the northeastern corner of Mississippi, pursuing a winding northerly course to empty into the Ohio River at Paducah, Kentucky. The drainage basin extends over an area of 39,000 square miles. A canal constructed in 1889 around Muscle Shoals has made the main stream navigable for 673 miles from its mouth. Its length is 950 miles.

Tennessee, The University of, situated at Knoxville, was established in 1794 as Blount College. In 1807 it became East Tennessee College; in 1809 East Tennessee University, and in 1879 the University of Tennessee. It is connected with the public schools and is co-educational. The University includes agricultural, educational, engineering, industrial and literary departments, their courses being substantially the same as those in other similar institutions. The industrial department, however, is for Negroes, and is located in Knoxville College. The medical and dental departments of the University are located at Nashville. Military science and drill are parts of the course, and are required studies for male Freshmen and Sophomores. The agricultural department organizes farmers' institutes, and the University has a farm and the State agricultural experiment-station. The University controls the congressional land-grant of 1862 to Tennessee, and its income is about $125,000. In 1932-33, the enrollment numbered 5,174 and the faculty 300.

Tennessee Valley Authority, "TVA," an important national agency created by the New Deal Administration which plans to develop the Tennessee River Valley by utilizing the hydro-electric power at Muscle Shoals and at two dams now under construction, Norris Dam at Cove Creek, and Joe Wheeler Dam. Upon completion the Norris Dam will be one of the world's largest artificial lakes. It is situated on the Clinch River, twenty miles northwest of Knoxville. A transmission line has been approved between the Norris Dam and the Wilson Dam at Muscle Shoals. The vast project of the "TVA" will directly affect more than one million inhabitants of the Tennessee Valley which extends through Alabama, Kentucky, Tennessee, Virginia, Georgia, North Carolina, and Mississippi. The valley abounds in natural resources which have been neglected for many years until soil erosion has prevented the production of satisfactory crops.

President Roosevelt recognized the pressing need of aiding the descendants of the old English, Scotch, and Irish settlers to regain a once productive land which had become a desert waste. The "TVA" was approved by an Act of Congress on May 18, 1933. The following directors were appointed: Chairman, Dr. Arthur E. Morgan (term May 18, 1933-1942); Harcourt A. Morgan (term June, 1933-1939); Daniel E. Lilienthal (term, June, 1933-1936); Co-ordinator and Secretary, Carl A. Bock, Knoxville, Tennessee; Construction Engineer, Barton M. Jones, Norris Dam; Manager of Government Property at Muscle Shoals, Frederick L. Schlemmer, Wilson Dam, Florence, Alabama. Fifty millions of dollars were allotted to the Authority with which to begin the project. The "TVA" is isolated from political control or interference. The directors report only to President Roosevelt and to Congress.

The first work begun by the Authority was construction of the Norris Dam at Cove Creek. Four years will be required to complete the project. Experts have been busily occupied planning the city which must be constructed to house the workers employed in the construction of the dam. The task of providing plans for proper sanitation, public buildings, streets, and recreation grounds has been entrusted to Earle Sumner Draper, director of Land Planning and Housing. The majority of men employed in the construction of the Norris Dam are from the vicinity of the surrounding hills of the Tennessee Valley.

On October 27, 1933, a contract between the "TVA" and the city of Tupelo, Tennessee, was effected by which electric current will be sold to the city for a period of twenty years at the rate of seven mills or less. The municipality of Tupelo was permitted under the contract to sell and supply electric current to neighboring rural communities and towns. Domestic rates in the municipality were reduced to a minimum of two-thirds from the starting rate; commercial rates were reduced fifty per cent, and industrial rates approximately seven mills per kilowatt hour.

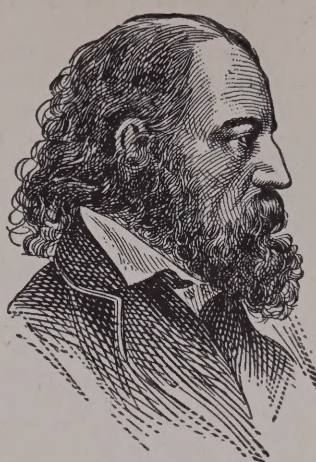
The Civilian Conservation Corps, "CCC" has aided in the construction of 24,000 soil erosion check dams and a soil erosion experiment station. One of the great tasks of the "TVA" is to prevent soil erosion and the clogging of reservoirs. Thus far it has been successful in the preliminary steps taken against the depletion of soil resources in the Tennessee River watershed. According to Edward C. M. Richards, chief of the Authority's forestry and soil erosion division, "Soil erosion prevention work already completed includes 6,000 dams, 5,000 log dams, 1,000 brush dams, 12,000 bag dams, and 200,000 yards of bank protection and matting. About thirty per cent of the erosion prevention work in the 500,000 acres surrounding the area which will later be submerged by the new Norris Lake has been completed. Preparations for vegetative control for the region are now being completed and this part of the work will get under way as soon as the planting season opens."

The project of the "TVA" includes soil erosion, forestry, the establishment of a balance of agriculture and industry, a wider use of mineral resources and the vocational adjustment of the unemployed. Twenty-five "CCC" camps are to be established along the watersheds above the Norris Dam. Two forest nurseries have already been established. They will have an ultimate capacity of 60,000,000 forest tree seedlings per year. More than 5,000 young men will plant trees and build terraces across the gullies. The reforestation division of the Authority has recently investigated land in the Tennessee Valley believed to be in need of reforestation. Up to the close of March, 1934, 6,725 acres above the Norris Dam had been investigated. A community town forest, the first in the Tennessee Valley, was recently established at Norris, Tennessee, and extends over 2,000 acres.

The "TVA" also intends to conduct educational work among the farmers, teaching them how to prevent soil erosion on their lands by terracing and strip-farming. It is hoped that many small industries will be developed which will be provided with cheap electric power supplied from the great hydro-electric plants. The natural resources of the Tennessee Valley are many. Asbestos, asphalt rock, limestone, graphite, hematite, manganese, mica, zinc, gold, peat, pyrites, glass sand, shales, and brown iron ore are but a few of the resources abounding in this region. The small quantities, however, in which they have been found have not warranted mass production. By developing small industries the farmer will be enabled to devote part of his time to the soil and part to work in the factory. The hydro-electric plants will enable scientists to carry on experiments with cheap fertilizers which will be produced in the nitrate-fixing plants served by cheap electric power. The plants will be non-profit making and will provide a national yardstick for electricity.

Tennis, a game of obscure origin, but certainly as old as the fourteenth century, when it was played chiefly in France. At present the name is applied to lawn-tennis, a modern game that arose about 1875. It is played with rackets and balls on courts of asphalt, cinder, grass or gravel. The court is divided midway by a net three feet high as its center and three and a half at the posts that support its ends. The court is 78 by 27 feet in area when two people play, but 78 feet long and 36 wide when four play. The object is for one player on one side of the net to knock the ball into the other players' part of the court in such a way that it cannot be returned. The racket consists of a tightly-strung, flat net of gut; the balls, of rubber thinly covered with white flannel or felt. White lines are traced on the court to indicate the base-lines, each 39 feet from the net; the side-lines 78 feet long, connecting the base-lines; the service-lines, each 21 feet from the net; and the half-court line, half-way between the side-lines, parallel to them and dividing the space on each side of the net into the right court and the left court. So the whole court consists of two half-courts, and these each of a right and a left court. One player takes the ball, stands with one foot on the base-line, the other behind, throws the ball into the air and strikes it in order to drive it, not into the opposite court, but into the court *diagonally* opposite. The other player must hit it on the first bound and return it into the first player's territory. If he does not, the first player, called the server, scores a point which is counted as 15. But if this second player, called the striker-out, return the ball to the server and *he* fail to return it again, the striker-out scores 15. In this way the game goes on under rules of its own, the second point for either player making the score 30, the third 40, and the fourth winning the game, unless *each* player has scored 40. In this case the score is called deuce, and *two* points must be *consecutively* scored for winning the game. When either player has won six games consecutively, a set has been played. But if each has won *five*, the set is deuce and *two* consecutive games must now be won. Serving the ball is done by each player in turn, but courts are exchanged between them only at the end of a set. Three or four players play essentially as do two.

Ten′nyson, Alfred, an English poet, was born at Somersby, Lincolnshire, Aug. 6, 1809. At Trinity College, Cambridge, where he studied, he gained a medal for a poem called *Timbuctoo*. His first publication, *Poems by Two Brothers*, was written in connection with his brother Charles, and so great an authority as Coleridge pronounced only the poems marked C. T. to have marks of poetical genius. A volume containing *The May-Queen, Mariana, A Dream of Fair Women* and *The Lotus-Eaters*, was followed by another collection, which included *Locksley Hall, Morte d'Arthur, St. Simon Stylites* and *Ulysses*, and from that time Tennyson easily held his place as the first of modern English poets. His great work, *In Memoriam*, is a series of poems on death, immortality and kindred themes, suggested by the loss of Arthur Hallam, his friend. It was first published without Tennyson's name in 1850. The *Ode on the Death of the Duke of Wellington* and *The Charge of the Light Brigade*, one of his most popular poems, were written as poet-laureate, a position in which he succeeded Wordsworth in November, 1850. *Maud*, published in 1855, was longer in winning public favor than most of Tennyson's work, but the *Idyls of the King* (*q. v.*) met with an enthusiastic reception. The first series consists of four stories in verse: *Enid, Vivien, Elaine* and *Guinevere*, to which a second series was added which included *The Holy Grail, Gareth and Lynette, Pelleas and Etarre, The Last Tournament* and *The Passing of Arthur*. They are the consummate form into which one of the greatest poets of the 19th century wrought those Arthurian legends which have haunted English romance for 700 years. *Enoch Arden* appeared in 1864 *Queen Mary* in 1875; *Harold* in 1876; *Becket* in 1884; and *Demeter and other Poems* in 1889. Tennyson lived a retired life, spending a large part of his time at his place on the Isle of Wight. He wrote carefully, altering and improving his poems, until they attained the perfect form in which they were given to the public. He received large sums of money for his later work, in some instances being paid as much as $50 a line His poems have been translated into German and Spanish. In 1883 he was made a peer. He died at Aldworth, in Surrey, England, Oct. 6, 1892. One of his last poems, *Crossing the Bar*, was used in the services at his burial in the poets' corner of Westminster Abbey. Consult Hallam Tennyson's *Alfred, Lord Tennyson;* Stedman's *Victorian Poets* and Frederic Harrison's *Tennyson, Ruskin and Mill.*

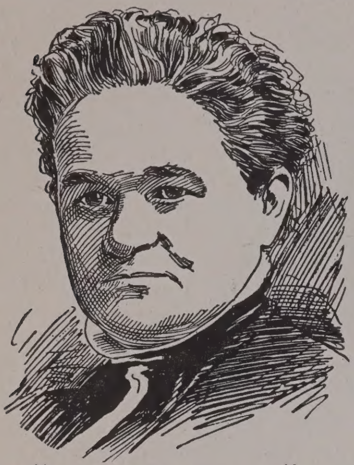


LORD TENNYSON

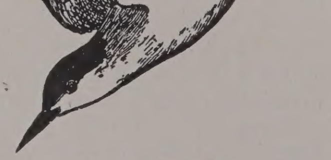
Terence (*tĕr′ĕns*), **Publius Terentius Afer,** a Latin poet, was born at Carthage about 195 B. C. He was a freed slave, and was educated by his master, a Roman senator His first play, *Andria*. was brought out in 166 B. C., and was so successful that he had the best young men of Rome for friends. When in Greece he translated 108 of Menander's comedies, and his death is commonly thought to have been due to grief at the loss of his translations. He has left six comedies: *The Woman of Andros, The Stepmother, The Self-Tormentor, The*

Eunuch, *The Brothers* and *Phormio*. The most popular is *The Eunuch*. They have been translated into most European languages. He died in 159 B. C.

Terhune (*tēr-hūn'*), **Mary Virginia,** American novelist, familiarly known by her pen-name of Marion Harland, was born in Amelia County, Va., Dec. 21, 1831. Her maiden name was Hawes, and in 1856 she married the Rev. Edward Payson Terhune. At an early age she began to write for the magazines, conducting *The Home-Maker* and *Babyhood* and contributing to *Wide-Awake* and *St. Nicholas*. Subsequently she resided in Massachusetts, but finally settled in New Jersey, where she has long been an untiring and helpful writer on themes connected with cooking, household management etc. Among her works are *The Story of Mary Washington*, *Common Sense in the Household*, *Common Sense in the Nursery*, *The Cottage Kitchen*, *Breakfast, Luncheon and Tea*, *Some Colonial Homesteads*, *Literary Hearthstones* and *Marion Harland's Complete Cook-Book*.


"MARION HARLAND"

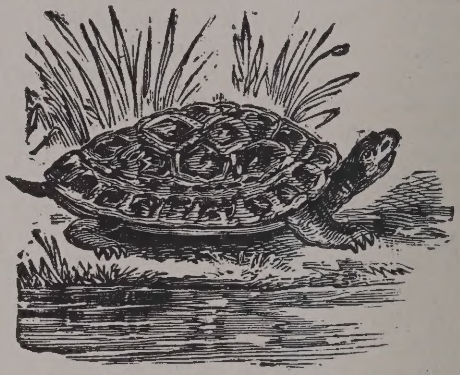
Tern, a water-bird with forked tail, related to the gulls. These beautiful birds, usually with gray and white plumage, are common in harbors. They are most graceful birds, and it is to be regretted that of late years they have been killed in immense numbers for trimming ladies' hats. There are about 50 known species of terns. They are coast-birds rather than open-sea birds, like the gulls. The common tern or sea-swallow is abundant on the Atlantic coast. It is about 15 inches long. There are a small black tern in the inland waters of North America and a similar form in Europe. See GULL.


TERN

Ter'ra-Cot'ta, unglazed, earthen ware, made of clay and hardened by burning. It generally is a dull red or buff in color. In England the materials used are clay, fine quartz-sand and finely pulverized, old pottery. It is used for statues, fonts, fountains, drain-tiles and ornaments for houses. The Greeks, Romans, Assyrians and Babylonians used it, manufacturing molds, statuary, vases and lamps. Often the articles were ornamented with designs of men, animals, fruits or flowers.

Terra del Fuego. See TIERRA DEL FUEGO.

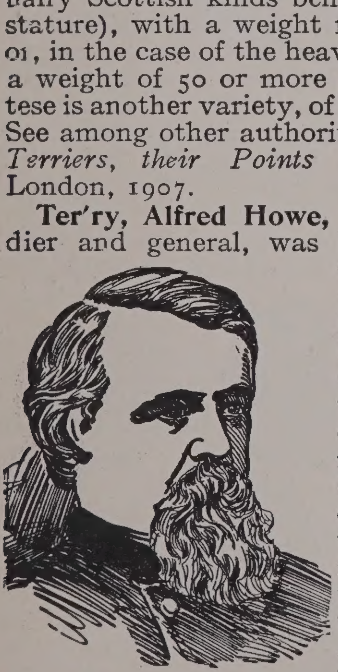
Ter'rapin, the name broadly applied to small turtles belonging to a family of pond-turtles (*Emydidæ*). It is frequently restricted to the salt-marsh terrapin or diamond-back turtle of the Atlantic coast, which is highly prized as food. The region whence the diamond-back terrapin is chiefly taken is Maryland, although it is captured from New York to Texas. It is caught in great numbers in the summer and kept in pens for winter. It is about eight inches long; swims well; and runs well on land. The red-bellied terrapin, ranging from New York to Virginia, is often substituted, but the flesh is of inferior quality.


TERRAPIN

Terre Haute (*tĕr're hōt'*), **Ind.,** county-seat of Vigo County, is upon the east bank of Wabash River on Fort Harrison prairie. It is 73 miles west of Indianapolis and almost equidistant (175 miles) from Cincinnati, Chicago, St. Louis and Louisville. The town was laid out in 1816 and has had a steady growth. Its principal buildings are Indiana Normal School, with over 12,000 students, Rose Polytechnic Institute, St. Mary's-of-the-Woods, for girls, and the high school, with 1,100 students. There are 26 public-school buildings and two commercial colleges well attended. There are nearly 325 teachers and about 7,500 children attending school. There are 48 miles of paved streets and 25 miles of electric car-line. The streets are well-lighted by electricity, and many fine business blocks and private residences line the avenues. The manufacture of glass is one of the principal industries. The great coal-beds underneath the region in which Terre Haute is located furnish a quality of coal from which producer-gas is made, which is cheaper and better than natural gas for manufacturing purposes. Among many other industries whose total exceeds $30,000,000 in yearly value, may be named rolling-mills, stamping-works, car-shops, wagon, tool, brick and tile works, hominy and flour mills and several distilleries. The distilling plants are among the largest in the country. The population of Terre Haute is 75,000.

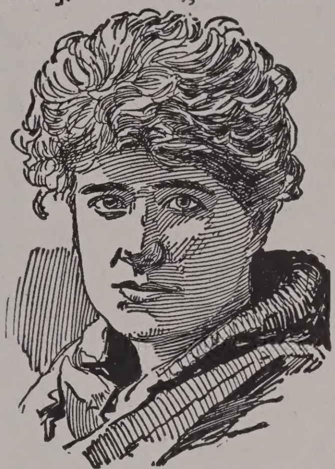
Ter'rell, Tex., an important city of Kaufman County, is 32 miles from Dallas, in a fine agricultural section. Among its industries are a cotton-oil mill, cotton-gins, a cotton-compress, flouring-mill, creamery, grain-elevator, iron and brass foundry, brick-works and the shops of the Texas Midland Railroad. Terrell has fine school-buildings, thorough course of study and North Texas University School (Meth. Epis.). It has good public buildings and several churches and North Texas Hospital for the Insane. It has all the facilities of a modern city, the service of two railroads and a population of 15,000.

Ter'rier (Latin *terra*, the earth; French, *terrier*, a burrow), a small, unsually shaggy-haired dog, but of many varieties. It is kept and bred by dog-fanciers, either as a pet or to kill rats and other vermin in their burrows or holes in the earth. The chief breeds are the Skye, Dandie Dinmont, fox and other Scotch varieties; the English bull-terrier, black and tan, the Airedale, Bedlington, Welsh and Irish breeds, besides the Boston terrier etc. In height the terrier stands from eight to 16 inches (the hairy Scottish kinds being generally low in stature), with a weight from 14 to 24 lbs. or, in the case of the heavy bull-terrier, with a weight of 50 or more pounds. The Maltese is another variety, of the lap-dog species. See among other authorities F. T. Barton's *Terriers, their Points and Management*, London, 1907.



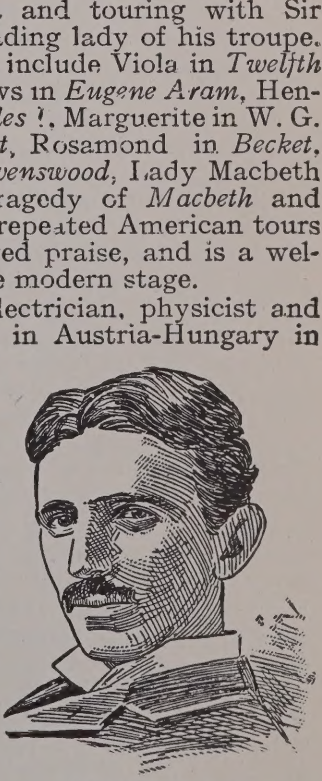
GENERAL TERRY

Ter'ry, Alfred Howe, an American soldier and general, was born at Hartford, Conn., Nov. 10, 1827, and died at New Haven, Conn., Dec. 16, 1890. After studying and practicing law he became colonel of a militia regiment in Connecticut, and on the outbreak of the Civil War his regiment was mustered into the United States service and took part in the first battle of Bull Run. Colonel Terry was present at the capture of Port Royal, at the siege of Fort Pulaski and in the operations against Charleston. He was promoted to brigadier-general, shared in the capture of Fort Wagner, and acted in Virginia in 1864 as division and corps commander. He served at Drury's Bluff, at Bermuda Hundred, at the siege of Petersburg, but his chief achievement as a soldier was his assault and capture of Fort Fisher (Jan. 15, 1865). After this he served under Sherman as corps-commander, and was at the capture of Wilmington. He was brevetted major-general in the regular army in 1865, and commanded the departments of Dakota and the south, and was in charge of successful expeditions against Sitting Bull and the Sioux.



ELLEN TERRY

Terry, Ellen (Alice) [Mrs. E. A. Wardell], an English actress, was born at Coventry, Feb. 27, 1848, and made her first appearance on the stage with Charles Kean's Shakespearian revivals, in 1858, in *The Winter's Tale* and as Prince Arthur in *King John.* She subsequently joined a Bristol company, of which Mrs. Kendal was a member, and appeared in London in 1863 as Gertrude in *The Little Treasure*, as Hero in *Much Ado About Nothing* and as Mary Meredith in *Our American Cousin.* After her marriage she retired from the stage for a while, but in 1867 reappeared, and later joined Mr. and Mrs. Bancroft's company, acting the part of Portia and touring with Sir Henry Irving as leading lady of his troupe. Her impersonations include Viola in *Twelfth Night*, Ruth Meadows in *Eugene Aram*, Henrietta Maria in *Charles I.*, Marguerite in W. G. Will's play of *Faust*, Rosamond in *Becket*, Lucy Ashton in *Ravenswood*, Lady Macbeth in Shakespeare's tragedy of *Macbeth* and others yet. In her repeated American tours she has won deserved praise, and is a welcome favorite of the modern stage.

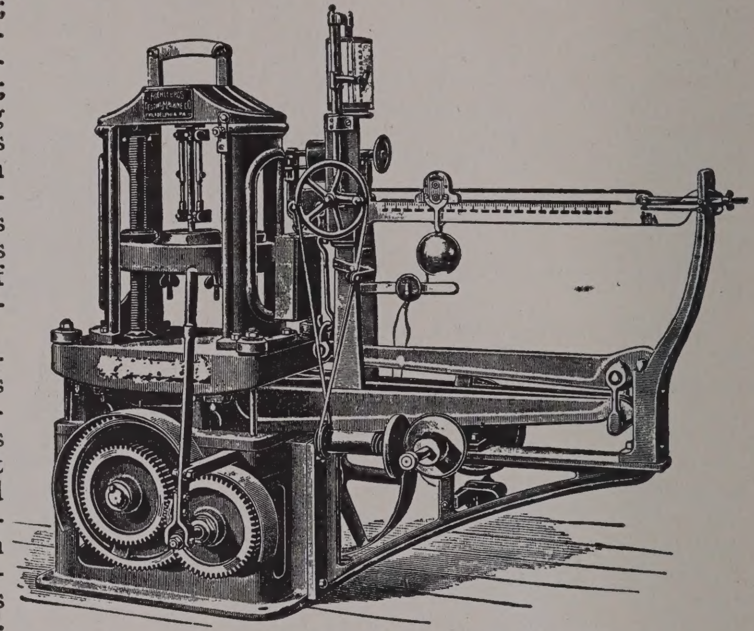


NIKOLA TESLA

Tes'la, Nikola, electrician, physicist and inventor, was born in Austria-Hungary in 1857, and studied at the polytechnic school at Gratz, the capital of Styria. For a time he was in the government telegraph engineering service, and in 1881 was employed at Paris in one of the large electric lighting companies of that city. In these employments he devoted himself to experiments in electricity and magnetism. On coming to the United States in 1884, he for a time was in the Edison works at Orange, N. J., but afterwards became electrician in the Tesla Electric-Light Company, and established a laboratory at New York for independent research. He is the inventor of the modern principle of the rotary magnetic field embodied in the apparatus used in the transmission of power from Niagara Falls; of new forms of dynamos, transformers, induction-coils, condensers, arc and incandescent lamps; and of the oscillator combining steam engine and dynamo. His researches in electrical oscillation have created a new field of electrical investigation; while he has made many startling innovations and inventions in using currents of high tension. He continues to reside in New York.

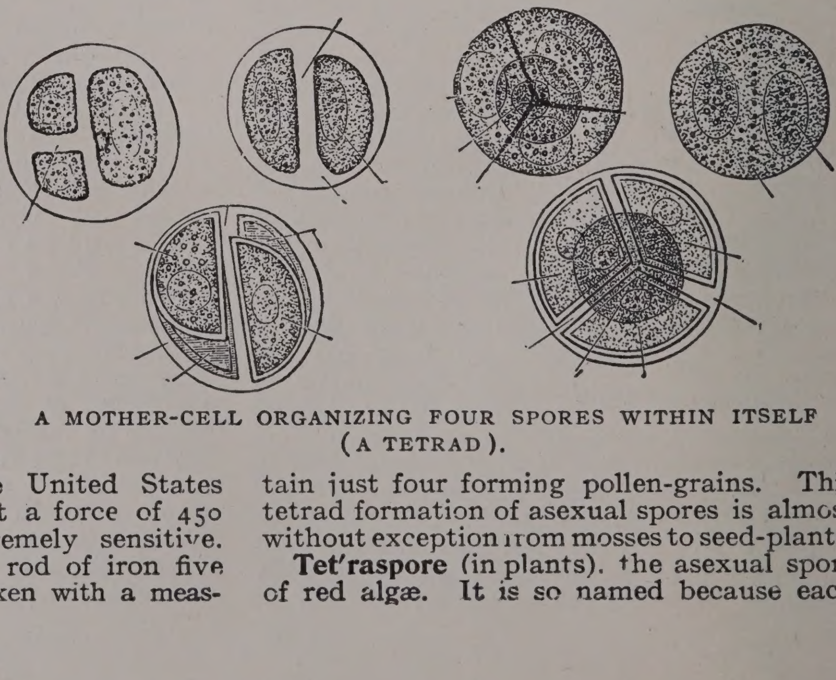
Tes'ta, the seed-coat, which usually is hard and bony. The *testa* is developed by the tissue of the integument of the ovule. Sometimes it develops into two very distinct layers, an outer fleshy layer and an inner hard one. Often it is variously marked and sculptured on the surface, enabling one to recognize the plant from which it has come. In fact, the color and markings of the *testa* are very important guides in the classification of many plants. It is the *testa* also which develops the various tufts of hairs and wings, which are often found on seeds and aid their dispersal by the wind. It sometimes develops hooks and spines, as grappling appendages, to aid in dispersal by animals.

Test'ing-Machine, a machine for testing materials. Testing-machines are arranged so as to apply measured forces to a sample of the material and to observe the corresponding deformation or breaking of the sample. The common tests are stretching, crushing, bending and tension. It is usual to apply the force either by a system of levers or by means of a hydraulic press The forces are usually measured by a scale-beam. When large samples are to be tested, as long, heavy beams, the machine must be very large. The largest and finest testing-machine ever constructed is that at the Watertown arsenal, belonging to the United States government. It can exert a force of 450 tons, and yet it is extremely sensitive. At the time of its trial a rod of iron five inches in diameter was broken with a measured force of 722,000 pounds and immediately afterward a horse-hair was broken with a measured force of one pound. For loads of 200 pounds it is sensitive to less than one two-millionth of the whole. Testing-machines have so many special forms and appliances that special treatises must be consulted for details. See Unwin's *Materials of Construction.*



AN AMERICAN TESTING-MACHINE

Tetrad (*tĕt'răd*) (in plants). In most of the higher plants each mother-cell organizes four asexual spores within itself. This group of four is called a tetrad. These four sister-spores cling together for a time, and sometimes always, but generally they soon separate from one another. For example, if a very young anther be sectioned and examined under the microscope, each spore-bearing cell (mother-cell) within it will be seen to contain just four forming pollen-grains. This tetrad formation of asexual spores is almost without exception from mosses to seed-plants.



A MOTHER-CELL ORGANIZING FOUR SPORES WITHIN ITSELF (A TETRAD).

Tet'raspore (in plants). The asexual spore of red algæ. It is so named because each sporangium commonly produces just four spores.

See Rhodophyceæ.

Teutones (*tū'tô-nēz*), a tribe of ancient Germany who lived on the Baltic Sea. They were a powerful tribe, and with their neighbors, the Cimbri, invaded the Roman republic near the close of the second century, B. C., and were almost destroyed by Marius at Aquæ Sextiæ in 102 B. C. In later times a tribe of Teutones lived in northwestern Germany between the Elbe River and the Baltic Sea. They are thought to have been the original Teutones from which the invading tribe was an offshoot. The name is now given to all ancient German races.

Texarkana (*tĕk-sär-kăn'ȧ*), a city and the seat of Miller County, Arkansas, is situated on the Arkansas border, adjoining Texarkana, Texas. It is 145 miles southwest of Little Rock, Arkansas. Texarkana is served by several railroads. An industrial college and the St. Agnes Academy are situated here. The post office is located on the State line. The chief industries include lumber and cottonseed mills, sewerpipe works, car and engine works, foundries and machine shops. The city was incorporated in 1881. The population in 1930 was 10,764.

Texarkana, a city in Bowie County, Texas, is situated on the Texas border, adjoining Texarkana, Arkansas, and sixty-five miles northwest of Shreveport, Louisiana. The cities have entirely distinct municipal governments, including separate city halls and schools. The St. Louis Southwestern Railroad maintains a hospital here. These adjoining cities are situated in the center of a rich agricultural region, with an abundance of pure water. There are valuable forests of pine, oak and ash in the vicinity. The chief industries of Texarkana, Texas, include cotton gins, cottonseed-oil mills and creosoting plants. The city was incorporated in 1875. The population in 1930 was 10,764.

Texas (*tĕk'sȧs*), the "Lone Star" State, is the largest State in the Union, and one of the west South Central states. It is bounded on the north by New Mexico and Oklahoma; on the east by Oklahoma, Arkansas, Louisiana and the Gulf of Mexico; on the south by the Gulf and the country of Mexico, and on the west by Mexico and New Mexico. The name "Texas" was the name of the Indians who first lived there, called "Tejas" or "Tecas" by the Spaniards. The word means "Friends." The popular name of "Lone Star State" was attached to the State because of the flag of the Republic of Texas, a single azure star on a white ground. Texas has an extreme length of 760 miles and an extreme breadth of 620 miles. It embraces more than eight per cent of the area of the entire United States, extending over 265,896 square miles, 3,498 square miles of which are water.

Surface and Drainage. The general topography of Texas, while varied, consists of a series of plains, rising gradually in a northwesterly direction. The surface may be divided into the coastal plain, the prairies, the Great Plains, the Staked Plain and the mountains. The coastal plain extends along the 375 miles of coast line. It is a low alluvial belt from twenty-five to sixty miles wide, alternating fertile lowland and barren soil. It is fringed by a chain of sandy islands that enclose shallow sounds such as Galveston Bay, Corpus Christi Bay and Laguna del Madre. On the barren soil grow cacti and low thorny bushes. The largest island is Padre Island, 100 miles in length; Galveston, Mustang and Matagorda are other large islands off the coast. The prairie belt is parallel to the coastal region, and is about 150 miles in width. This is rich rolling land, with occasional strips of timber. The western section of this belt, called the "Black Prairie" is one of the richest agricultural regions in Texas. The "Grand Prairie" is another fertile strip of land lying in the west central section. Beyond this rise the Great Plains, a broad, treeless, steadily elevated mesa, excellent for grazing. Much of this soil is fertile, although in some places the land is rough and broken, and occasional bluffs lend beauty to the surrounding country. These Great Plains rise to a height of about 2,000 feet above sea level. In the northwestern section, the land rises abruptly from these plains to the Staked Plain, or *Llano Estacado,* a vast plateau from 2,000 to 4,500 feet above sea level, arid, covered scantily with dry grass and mesquite. A number of spurs of the Rocky Mountains extend into the State from the north, between the Pecos River and the Rio Grande. El Capitán, in the Guadalupe Mountains in Culberson County, is the highest peak in the State, rising to an elevation of 8,700 feet. So much of the land is high, however, that the mean elevation is 1,700 feet, in spite of the low level of the coastal plain. Western Texas is almost entirely without woodlands, but in the eastern part of the State there was formerly a wooded area comprising nearly 8,000,000 acres. Extensive lumbering has greatly reduced this area. Yellow pine is the principal wood found in the State. In northeastern Texas, where the pine forests are heavy, there are also dense growths of holly, hawthorne and magnolia.

The soils of Texas vary from the gray silt and fine sandy loams of the coast to the brown and black sandy loam of the northern sections. In the southern part of the State are alluvial bottoms of red and brown sandy loams or black sticky clays. The central prairie soils are black waxy clays with marginal loams and sandy loams. The High Plains have loams that are reddish brown and gravelly, sandy, or silty and clay-like, while the Staked Plain is arid. In the western portions of Texas the soil is a composition of clay and weathered limestone, very fertile when irrigated. Almost the entire area of the State is potentially productive, although the black prairie soils of central Texas form the richest agricultural section.

Texas has an excellent drainage system, with many rivers, practically all of which flow in a southeastward direction and empty into the Gulf of Mexico. Along all the great coastal border there are only four harbors with lighthouses, and the United States Government has expended millions of dollars building jetties at Galveston, Sabine Pass and a number of other places. This coast line is paralleled by the chain of islands of white sand, which have the Gulf of Mexico on one side and on the other, the deep navigable bayous and lagoons that reach up into the cotton and sugar plantations of the mainland.

Across the Panhandle region in northern Texas flows the Canadian River, which continues on its course into Oklahoma and Arkansas. The Red River rises near the New Mexican border, forms much of the boundary between Texas and Oklahoma, leaving the State at the northeastern corner to drop down through Arkansas into Louisiana and join the Mississippi. The Sabine River rises near the northern border and flows along the boundary between Texas and Louisiana, to be met near the Gulf by the Neches River from the northwest. Farther west flows the Trinity River, which rises in the northern part of the State and flows 535 miles to drain into the Gulf through Galveston Bay. Beyond is the Brazos, the most important river in the State, flowing through the richest territory. It has a total length of 950 miles. The Colorado, San Antonio and Nueces are short rivers emptying directly into the Gulf. In the great western section of the State the only river of importance is the Pecos with its tributaries. It is 800 miles in total length. The Pecos enters Texas at the northwestern edge of Loving County and takes a southeasterly direction to enter the Rio Grande in Valverde County. The Rio Grande rises in Colorado, crosses the entire State of New Mexico, forms the entire boundary line between Texas and Mexico, entering the Gulf after flowing a distance of 1,650 miles. Between the Pecos and the Rio Grande in the mountainous region the rivers in the valleys die quickly, and bitter salt-lakes afford almost the only water. In the Gulf, Padre Island extends in a long narrow strip parallel to the coast, from the mouth of the Rio Grande northeastward to Corpus Christi Bay. Between Padre Island and the Texas Coast lies Laguna de Madre, ninety miles long and eight miles wide, a lagoon with waters so salty that fish die upon entering it. On its shores lie the deposits which furnish most of the salt used in Texas. There are comparatively few lakes in the State aside from these bitter salt waters of the western portion. Caddo Lake lies partly in Texas and partly in Louisiana, and is the largest of such waters. Other important lakes in the State include Sabine Lake, through which the Sabine River flows just before it empties into the Gulf through Sabine Pass, Grand, and Clear Lakes. The great bays of the coast are Galveston, Matagorda, San Antonio, Corpus Christi and Baffin. Between San Antonio and Corpus Christi lies the little group of connected bays, Charles, Copaña and Aransas. All of the bays are shallow, as are the lagoons along the shore.

Climate. Due to the vast expanse of Texas there is a very great range in temperature, which varies according to the locality and altitude. In Crosby County, bordering the Staked Plain, there is a range of temperature from ninety degrees to twenty-six degrees Fahrenheit, while along the farthest north coastline it varies from but eighty-eight to fifty degrees. At Galveston on the coast, there is a warm, moist, equable climate, which diminishes gradually inland as the altitude rises. On the dry high plains there is often considerable heat during the summer months. The rainfall varies from ten inches in the west to fifty inches in the east. Much of the region west, southwest and northwest of the center of the State, has not enough rainfall for agriculture without irrigation.

Minerals. The mineral products of Texas are very important, although its mineral resources have never been fully developed. Texas leads other states in the Union in the production of petroleum and natural gas, and it is the only State now producing sulphur. It is rich in all the base minerals. There are extensive undeveloped potash fields in the western part of the State. In 1932, there were produced 311,069,000 barrels of petroleum, 352,500,000 gallons of natural gasoline or petrol, and in 1931, 464,580,000 cubic feet of natural gas. The output of sulphur in 1932 totalled 876,000 long tons, a decline from the production of 1931 and the record of 2,558,981 tons in 1930. Oil is found from southeast on the Gulf all the way to the northwest, somewhat concurrent with the Mexican field in the south, and in the northwest with that of Kansas and Oklahoma. The content is rich. The Texas gas wells in the region of Dallas and Fort Worth are the chief source of the helium gas for the United States Navy dirigibles. Other important minerals include quicksilver, salt, gypsum, granite, sandstone and limestone. The coal mines are large, extensive coal beds, both bituminous and lignite, underlying much of the State. Coal production in 1932 amounted to 620,000 net tons. There is considerable iron ore, much pottery clay, and some marble and cinnabar. Beyond the Pecos River, gold, silver, copper and lead are mined in small quantities. There are mineral springs in several sections. The springs of Mineral Wells and Sulphur, Texas, are especially famous.

Production and Industry. In 1932, Texas attained first rank in the Union in the value of exports which originated within the State, having been second to New York in 1931. The petroleum refineries are the leading industry, sixty-two of these refineries in 1929 having an output valued at $519,005,136. In that year, there were 5,187 manufacturing establishments within the State, which had 131,503 employés who earned $147,888,053 and produced goods valued at $1,449,801,916. Wholesale slaughtering, meat packing houses, cottonseed oil and meal factories, and lumber mills are among the State's other important industries.

In spite of its great mineral resources, however, the chief industry of the State centers in agriculture, in which Texas is one of the leading states of the Union. It is the chief cotton-growing State. It is the leading State in the livestock industry, being first in rank in the number of all cattle, of sheep and of mules, and in wool and mohair production. It is the chief State in the Union in the production of grain sorghum, of onions and of pecans. Many fruits and vegetables are raised. In 1930, there were in Texas 495,490 farms containing 125,041,764 acres. The value of all crops, livestock and livestock products marketed in 1929 was $925,169,000, a greater value than that of any other State in the Union. There are 797,695 acres under irrigation.

The chief agricultural crops, with their production in 1932, are: cotton, 4,445,000 bales; grain sorghum, 34,815,000 bushels; onions, 4,826,000 bushels; pecans, 19,500,000 pounds; maize, 102,726,000 bushels; wheat, 29,580,000 bushels; oats, 41,976,000 bushels; rice, 8,880,000 bushels; potatoes, 4,154,000 bushels; sweet potatoes, 7,600,000 bushels, and peanuts, 125,950,000 pounds. There were in the State in 1932, 6,127,000 cattle; 7,312,000 sheep; 960,000 mules; 704,000 horses; 1,288,000 milch cows, and 2,088,000 swine. The wool clip in 1932 amounted to 57,105,000 pounds. In 1931, there were 16,400,000 pounds of mohair produced from 3,570,000 goats. Yellow pine and hardwoods are taken from the forests, the cut in 1931 being 555,814 M. board feet.

Transportation. Texas leads every state in the Union in railway mileage, with 17,203 miles of steam railway in 1932. There were also 518 miles of electric interurban railway. The State maintains 18,868 miles of highway, 11,585 miles of which are surfaced. There are 1,047 miles of navigable rivers within the State. The Red River, the Trinity and the Colorado are the most important of these waters for navigation. The long coastline affords excellent facilities for water transportation, augmented by important canals. Galveston is the chief seaport and second only to New York as a commercial port. Seventeen railroads converge at Houston, which, although fifty miles from the sea, has been an important shipping point since 1925. In that year a canal was completed by deepening and widening a thirty-foot channel of the Buffalo Bayou and San Jacinto River at a total cost of $20,000,000, including the Municipal Terminal with fourteen wharves. This provided Houston with a sea outlet, making it the largest inland cotton market in the world, although Galveston is the most important outlet for United States cotton. The total exports from land and water ports of Texas in 1932 amounted to $307,046,000 of which $129,543,000 came from Houston.

Population. The population of Texas, according to the census of 1930, was 5,824,715, an increase of 24.9 per cent since 1920. Of this total, 1.7 per cent were foreign born whites, 14.7 per cent were Negroes and forty-one per cent urban. The chief cities, with their populations in 1930, are: Houston, 292,352; Dallas, 260,475; San Antonio, 231,542; Fort Worth, 163,447; El Paso, 102,421; Beaumont, 57,732; Austin, the capital, 53,120; Galveston, 52,938; Waco, 52,848, and Port Arthur, 50,902.

Education. The rate of illiteracy in Texas was 6.8 per cent in 1930. This percentage is low among the whites, and highest among the Negroes and Mexicans. School attendance is compulsory between the ages of eight and fourteen. Separate schools are maintained for white and negro children. In 1932 there were 1,052,827 pupils and 30,747 teachers in the public elementary schools, and 256,919 pupils and 9,063 teachers in the high schools. The seven teachers' colleges had an enrollment of 15,981 students and 484 teachers. There are many higher institutions of learning. The University of Texas was established at Austin in 1883. In 1932 it had an enrollment of 6,907, and a faculty of 429. The State also maintains the Agricultural and Mechanical College, with 2,301 students; the College of Industrial Arts, which enrolled 1,739 students in 1932; the Texas Technological College, with an enrollment of 2,155; and the Prairie View State Normal and Industrial College for negro students, 2,066 of whom were enrolled in 1932.

Government. Texas is divided into 254 counties. Under the terms of the joint resolution of Congress for its annexation in 1845, the State may subdivide its area into any number not exceeding four additional states of convenient size and sufficient population, which shall be entitled to admission into the Union. March 2, 1836, is known as Texas Independence Day, and the anniversary is a State holiday. The Legislature comprises a Senate of thirty-one members elected for four years, half of whom retire every two years, and a House of Representatives of 150 members elected for a term of two years. Texas is represented in the National Congress by two Senators and twenty-one Representatives.

History. At a very early date, Texas was explored by Spaniards, adventurers from the neighboring country of Mexico. La Salle in 1685 founded Fort St. Louis on Lavaca River, but the settlement was blotted out by illness and Indian raids La Salle's exploration had served to warn the Spaniards, however, and they established many missions, to hold the country against French occupation. Chief among these was San Francisco de los Tejas, founded in 1690 near the Neches River, and the missions of Dolores, San Antonio, and San Agostino. Although San Francisco de los Tejas was abandoned in 1693, the Spaniards continued to found missions, many of which were also abandoned, as there was no rivalry. Before the close of the eighteenth century, the remaining missions had grouped themselves around three chief locations; Nacodoches, near the Neches River; San Antonio de Bejar, founded in 1718 in the southwest, and a place in the southern part of the State near the Guadalupe River. Indian raids and rebellions were followed by massacres and Texas became almost deserted. Philip Nolan, the first American to cross Texas from Louisiana, led an exploring party into the region in 1800. After the Louisiana Purchase in 1803, explorers and colonists began a regular conquest of the country through settlement. Considerable difficulty arose over the land between the Sabine and the Rio Grande rivers, but in 1806 representatives of Spain and the United States met at the Sabine and settled the question by recognition of the ownership of Spain as far as the Sabine River, thus averting war.

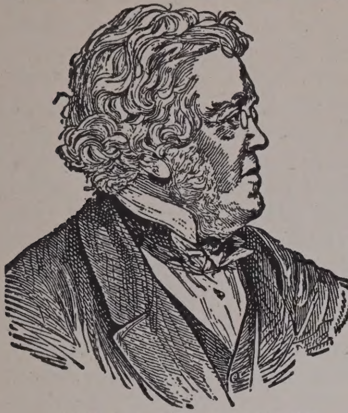
There were so few people in Texas that Mexico invited American colonists to enter in 1820. The following year Mexico secured its independence from Spain. In 1822, Stephen A. Austin led a large group of American colonists into Texas. In 1824 Mexico established a federal republic, in which Texas, with Coahuila and Nuevo Leon, was made a separate province. American immigration increased so rapidly, that by 1830 there were 20,000 American settlers within the present boundaries of the State. The Mexican government became greatly alarmed, and forbade further immigration. A deliberate and systematic campaign of persecution against the Americans was begun. Military rule was established, all ports except Anahuac were closed, and anti-colonization and anti-slavery laws were passed. The settlers in Texas were roused to violent opposition. A revolt was instigated, and in 1832, Texas called a convention to elect a president, and asked for a separate government.

The climax came in 1835, when Santa Anna, then president of Mexico, tried to reduce the province of Texas to a mere department, and to collect duties. Open warfare followed. The Texans rose *en masse* and on March 2, 1836, declared the province to be an independent republic. Meanwhile Santa Anna had besieged the Alamo, a garrison in buildings originally those of the Franciscan mission San Antonio de Valera, erected about 1718. The siege started on February 23, and lasted until March 6, on which date was fought the Battle of the Alamo, resulting in the hand-to-hand encounter in which there were only 140 Texans against about 4,000 Mexicans. This cruel massacre proved a great inspiration to the Texans, however, who adopted "Remember the Alamo!" as a battlecry. On April 21, a force of Americans under General Sam Houston decisively defeated the Mexicans on the banks of the San Jacinto River, and took Santa Anna prisoner. The republic of Texas was thereupon established, a constitution adopted and Sam Houston chosen Governor, with the capital of the State established at Austin. In 1839, the United States acknowledged the independence of Texas. At once desire for annexation was expressed, but the Northern states feared annexation of so large a slave territory. In the presidential election of 1844, the Texas question was paramount, and cost Van Buren his reëlection. On December 29, 1845, Texas was admitted to the Union. Immediately a dispute arose over the western boundary. Mexico claimed the territory lying between the Rio Grande and the Nueces rivers, which was part of the former territory of Coahuila. The United States government supported the claims of Texas, and war with Mexico opened early in 1846. The Treaty of Guadalupe Hidalgo, on February 2, 1848, closed that war and fixed the boundary at the Rio Grande River. The United States then bought extensive lands from Texas to the north and west, for $10,000,000. That transaction fixed the present boundaries of Texas and included the purchase of New Mexico.

Texas joined the Confederacy during the Civil War, but in its isolated situation, it suffered very little from actual conflict, although the final battle of the war, that of Palo Alto, was fought in Texas on May 13, 1865. Texas did not hasten to ratify the thirteenth Amendment after the war, and was not readmitted to the Union until March 30, 1870, although in 1866 the old constitution had been amended to abolish slavery, annul the right of secession and repudiate the war debt. A new Constitution was adopted in 1869, and another new one in 1876.

The International Arbitration Court on June 15, 1911, rendered a decision in the Chamizal boundary dispute between the United States and Mexico, involving about 600 acres of land near El Paso, Texas. The course of the Rio Grande had changed, resulting in the dispute. The court awarded all land gained by accretion to the United States, and all land cut off from Mexico to Mexico, a compromise promise of satisfaction to neither.

Texas, The University of, is situated chiefly at Austin with its medical department at Galveston. In 1839 the Texan Republic proposed the establishment of this university. In 1858 the legislature of the State provided for its organization. In 1876 the constitution appropriated 1,000,000 acres for a site. It was incorporated in 1881, and opened in 1883 at which time an additional 1,000,000 acres of land were given. This co-educational institution is the crown of the Texan school-system. It is governed by regents appointed by the Governor, two every two years, for terms of eight years, the State Senate confirming the nominations. It includes the departments of literature, science and arts; engineering; law; medicine (including a pharmaceutical school), and summer schools. It also has had charge of the Texan mineral survey since 1901. In 1932-3, the enrollment numbered 7,241 and the faculty 434.



WILLIAM MAKEPEACE THACKERAY

Thack'eray, William Makepeace, a great novelist of England, was born at Calcutta, India, in 1811. His father was in the civil service of the East India Company, and dying young left his son a fortune of $100,000. When William was seven, he was sent to England and placed in the noted Charterhouse School, often mentioned in his books. He next went to Cambridge, and in 1831 was at Weimar, where he saw Goethe. His ambition was to become an artist, and he traveled over most of Europe, studying at Paris and at Rome. His drawings were quaint, picturesque and truthful; his art may be seen in the illustrations of his novels, which, as he expressed it, were "illuminated by the author's own candles." But his success in this line did not satisfy him and he tried his hand at writing, much to the delight of readers then and now. He first wrote for *Fraser's Magazine*, in which appeared *The Great Hoggarty Diamond* and *Barry Lyndon.* Most of his capital had been spent in foreign travel and losing investments; he now adopted literature as a profession. His *Snob Papers* and *Jeames's Diary* in *Punch* made him known, but his reputation as one of the greatest of English novelists was made by *Vanity Fair* (1846-8), which disputes the first place among English stories with such books as *Ivanhoe, Adam Bede, Tom Jones* and *David Copperfield.* In 1849 he published *Pendennis*, one of the best of his books, which tells his own story. His lectures on *English Humorists* and on *The Four Georges* were delivered in America as well as in England. In 1852-5 appeared *Henry Esmond* and *The Newcomes*, his finest works. He also wrote *The Virginians*, a sequel to *Henry Esmond*, in which Washington figures. In 1859 he became the first editor of *Cornhill Magazine.* Thackeray was tall and powerfully built, with massive head, and, as he aged, silvery white hair. He died at London, Dec. 24, 1863. See *Life* by Trollope.

Thales (*thā'lēz*). Greek sage and philosopher, was born at Miletus, Asia Minor, about 640 B. C. and died about 546. One of the Seven Wise Men (*q. v.*) of Greece, he was noted especially as an astronomer and geometer and was the earliest of the Ionian natural philosophers, regarding water as the principle of all things. A remarkable fact concerning Thales is his predicting, so early in the history of astronomical science, an eclipse of the sun, which is alleged to have occurred on May 28, 585 B. C., though doubted on the ground that in Thales' era certain astronomical facts necessary to predict an eclipse with any chance of success were not then known. Some modern astronomers have, however, stated that the prediction of Thales did come true on the date given, and the date agrees with that given by Pliny the Elder in his *Natural History.*

Thallium (*thăl'lĭ-ŭm*), a metal discovered in London in 1861 by the use of the spectrum. It is found in certain iron and copper pyrites, of which it forms about a four-thousandth part, and some in mica. It is generally obtained from the fine dust of pyrites burners. It resembles lead in appearance, is very soft, can be hammered into leaves, tarnishes quickly, gives a green color to a flame, and forms many compounds.

Thallophytes (*thăl'lō-fīts*), the lowest of the four great divisions of the plant kingdom. The name means thallus-plants, the thallus being the characteristic plant-body, which is usually prostrate and has no differentiation of nutritive organs, as the roots, stems and leaves of higher plants. All parts of this body are practically alike. There are two great general divisions of the group: (1) *Algæ*, which contain chlorophyll and hence can manufacture their own food and live independent of any other organisms; and (2) *Fungi*, which do not contain chlorophyll and hence are dependent upon other organisms for their food. Besides the ordinary algæ and fungi the thallophytes contain many forms which are not classified easily, as slime-moulds, bacteria, diatoms etc. The group is an immense one, and contains the minutest of living forms, as well as some which are very bulky, as some of the seaweeds. Thallophytes are of special interest as representing the beginnings of the plant-kingdom, the group from which all the higher forms have been derived.

Thal'lus, the characteristic plant-body of the thallophytes. The thallus-body is also characteristic of the liverworts and of the gametophyte of ferns.

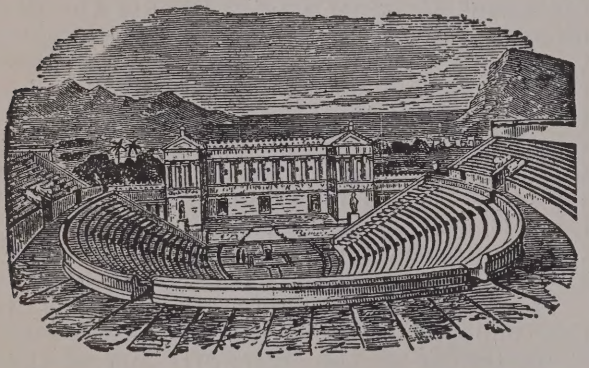
Thames (*tĕmz*), a river of England rising in Cotswold Hills and flowing to the North Sea. It is about 220 miles long, and as far as London, 60 miles from its mouth, is navigable for large vessels. It is 18 miles wide at its mouth, and the tide flows up for 72 miles. The largest river of England, it also is the most important, having as large a traffic, probably, as any river in the world. Its bridges and tunnels at London, its great docks and embankments, are a part of the sights of the city. Canals connect it with the Avon and the Severn, the Sussex coast and the canal system of central England.

Thanks'giving Day, a religious festival peculiar to the United States, resembling the Hebrew feast of ingathering. The

Plymouth colony celebrated the first thanksgiving day after the harvest in 1621, four young men being sent out hunting to make provision for the feast. Such days were appointed after this at different intervals and for various objects in New England and New York. Congress recommended a thanksgiving day yearly during the Revolutionary War, but from 1784 to 1789 there was no national appointment of the festival. In 1784 a day of thanksgiving for the adoption of the Constitution was recommended, and one in 1796 because of the suppression of a riot. For years the festival was almost exclusively a New England institution, celebrated by religious services in the churches, the sermon being often a political address, and by the gathering at the old home of the scattered members of the family. The day gradually became a custom in the western and some of the southern states, each appointing its own day. During the Civil War proclamations for public thanksgiving were issued in 1862, 1863 and 1864, and since that time the day has been regularly appointed by the president of the United States. It usually is observed on the last Thursday in November.

Thayer (*thâr*), **Abbott Handerson,** an American artist, was born at Boston in 1849. He studied chiefly under Gérôme at Paris. His subjects are animals, genre and landscapes, but he has done some wall-painting.

The'ater. The first theater in Greece, the birthplace of the drama, is said to have been a wagon. The plays of Æschylus were represented on a wooden scaffold. About 500 B. C. one of these scaffolds gave way, and the inventive Athenians at once set about building the famous stone theater of Dionysus. Similar theaters were built in every Greek city, and the ruins of many may be seen to-day. The largest is at Ephesus, and was 660 feet across. These theaters were built with seats in semicircular rows rising one behind and above the other, and were often cut out of solid rock. In the center, at the lowest point, stood the orchestra, in front of the *proscenium* or stage, back of which was a solid wall, called the scene, ornamented with pillars and cornices. There was no roof, but an awning kept off the sun's rays, for the plays were always given in daytime. The Romans, who took the best of everything the Greeks had, built similar theaters of the greatest magnificence, besides their huge amphitheaters. Both in Athens and Rome the theaters were built large enough to seat almost all the citizens, who generally attended in a mass at the expense of the government, for from the time of Pericles plays were made free to all. To enable these audiences of 80,000, 100,000 or more to hear, the actors wore masks with mouthpieces which answered the purpose of speaking-trumpets. Female characters were represented by boys and it was not till the 17th century that actresses were allowed on the French and English stages. In the middle ages the miracle-plays were played in cathedrals.



THEATER OF SEGESTA, SICILY — RESTORED

The modern theater dates from the 16th century, the first ones being built at Vicenza and Venice. The famous Palais Royal at Paris was built by Cardinal Richelieu in 1639. The first English playhouse was the London theater, built in 1576. About the same time were built the Curtain, Blackfriars and Whitefriars. The first theater in America was opened at Williamsburg, Va., in 1752. The largest and finest theater in the world is the Grand Opera-House of Paris. In China and Japan every little village has its theater. See Amphitheater, Drama and Miracle-Plays.

Thebes (*thēbz*), a celebrated Egyptian city, stands on the Nile, and anciently was the capital of upper Egypt. Its great ruins fill nine townships. The Nile flows through the city and divides it into four quarters. Thebes was at its height from 1500 to 1000 B. C., when it had supplanted Memphis, the ancient capital of the Pharaohs. This City-of-a-Hundred-Gates, as Homer called it, sent out 20,000 war-chariots, was filled with palaces and temples, and contained the cemeteries of the Theban monarchs. Later the capital was moved to Sais and then to Memphis, and Cambyses, the Persian plundered it of $10,000,000. Alexandria was founded, and so its splendor departed. There are now only a few Arab families of *fellahin*, who gain a living by guiding travelers about the ruins or by selling articles rifled from the tombs. The ruins are the most famous in Egypt. Among them are the temple of Karnak (*q. v.*), a mass of obelisks, courts and halls; the Ramesseum (*q. v.*), built by Rameses II, with a broken colossal statue, the largest in Egypt, of that king, weighing 887½ tons; the vocal statue of King Memnon, supposed in early times to make a sound at sunrise; the cemeteries of the sacred apes; and the Valley of the Tombs of the Queens. See Rawlinson's *Story of Ancient Egypt*.

Thebes, the chief city of Bœotia in Greece stood on a mountain-slope between two streams in the southern part of Bœotia.

It is said to have been founded by a colony of Phœnicians under Cadmus, after whom the city was called Cadmeia, a name afterwards applied only to the citadel. Nothing certain is known of the place till its unsuccessful war with Athens in the 6th century B. C. During the Persian War Thebes sided with Xerxes against the other Greek cities, and for this desertion Athens wished to deprive it of its leadership of the Bœotian towns, but it was saved by the interference of jealous Sparta. It sided with Sparta in the Peloponnesian War, but soon afterwards, fearful of Sparta's great power, befriended the Athenians who fled from the oppression of the Thirty Tyrants, and sent a force of its citizens with Thrasybulus and his fellow-patriots to deliver Athens. Thebes became the foremost power in Greece after the long war (379-362 B. C.) in which, under the leadership of Epaminondas, she triumphed over Sparta. Demosthenes induced Athens and Thebes to join hands against the encroachments of Philip of Macedon; but it was too late, and in 338 the battle of Chæronea crushed the liberties of Greece; a second rising was put down by Alexander, who razed Thebes to the ground and sold the whole body of citizens — men, women and children — into slavery. Rebuilt in 315 by Cassander, it was destroyed by the Romans; was again a thriving town in the 11th and 12th centuries; but now has only about 3,250 inhabitants.

Theiss (*tīs*), an important branch of the Danube and the chief river of Hungary, is formed by the Black Theiss and the White Theiss in the Carpathian Mountains on the borders of Galicia. It flows through a mountain-pass, then in a zigzag course past Tokay and Szolnok, and for 300 miles parallels the Danube. It is navigable for large vessels to Szolnok, and is 828 miles long.

Themis (*thē′mĭs*), in Greek story, was the daughter of Uranos and Gæa (Heaven and Earth), the wife of Zeus and mother of the hours, fates, equity, justice and peace. In modern art Themis is represented as Justice with her eyes bandaged, holding a pair of evenly balanced scales in one hand and a sword in the other.

Themistocles (*thē-mĭs′tō-klēz*), a great Athenian general and statesman, was born about 514 B. C. In politics he became the rival of Aristides the Just, who was ostracized in 483 B. C., leaving Themistocles the foremost citizen of Athens. To get ready for the coming Persian invasion Themistocles persuaded the Athenians to set apart the proceeds of the government silver-mines for building a navy, believing that the only chance of victory was on the sea. The naval victories of Artemisium and Salamis (480) were won from the Persians chiefly through the efforts of Themistocles, though he allowed the standing claim of Sparta to the chief command, which was given to Eurybiades. The victory at Salamis (*q. v.*) raised his reputation to the highest point. But his popularity lasted only till 471, when he was banished for bribery. The rest of his life was spent at the Persian court of Artaxerxes, where he was greatly honored. See Fyffe's *Primer of Greek History*.

Theocritus (*thē-ŏk′rĭ-tŭs*), a famous Greek poet, a native of Syracuse, who flourished about 272 B. C. About the close of the reign of Ptolemy Soter he visited Alexandria, where his first verses were written. Here Ptolemy Philadelphius became his patron, but later we find him back at the court of Hiero II of Syracuse. For some reason he became dissatisfied with court-life. Turning his attention to the scenes and life of the country, he wrote 30 unexampled idyls of the everyday life of the Sicilian peasantry, which keep their charms of freshness and nature even to the present day. Besides the idyls, a few lines of a poem called *Berenice* and some epigrams are all that are left of his writings.

Theod′olite, an instrument used by surveyors, specially constructed for measuring horizontal and vertical angles by means of a telescope the movements of which can be graduated and marked very accurately. For triangulation-work theodolites are usually made larger and more powerful than transits. In instruments made in this country the graduation is in ordinary degrees of 90 to the quadrant; though those constructed abroad, especially in France, have the centesimal division of 100 grades to the quadrant.

Theodoric (*thē-ŏd′ō-rĭk*) **the Great,** the founder of the kingdom of the Ostrogoths, which embraced Italy, Sicily, southeastern Gaul, Rhætia, Noricum, Pannonia and Dalmatia, was born at Neusiedler Lake, south of Vienna, in 455 A. D. His father, Theodemir, and two uncles had freed their nation from the yoke of the Huns on the death of Attila; part of the Goths had gone to Italy and Gaul; and Theodemir was left sole king of the Ostrogoths in Pannonia. Theodoric spent his boyhood as a hostage at the court of Constantinople, where he was brought up with Emperor Leo's children. After proving himself an able warrior, Theodoric became king of his people in 475. Two wars were now waged against Emperor Zeno, who, to save his capital from the Ostrogoths, urged Theodoric to conquer Italy, then ruled by Odoacer, the usurper. In 488 the young king led the whole nation, some 200,000, across the Alps, won four pitched battles, shut up Odoacer in Ravenna and after a three years' siege, captured both the usurper and the city. Once king of Italy, he governed the peninsula as well as it had ever been ruled under the Roman empire. He protected the Visigoths, checked the Franks and gained Provence. Near the end of his prosperous reign a conspiracy was discovered in which Boëtius the philosopher, his favorite, seemed to be mixed up. After the supposed traitor had been put to death his innocence was proven, and Theodoric's remorse undoubtedly hastened his death in 526. See BOETIUS and GOTHS.

Theodosius (*thē'ō-dō'shĭ-ŭs*) **I, The Great,** was of Spanish descent, and was born about 346 A. D. His father was Theodosius, the able general who freed southern Britain from the savage Caledonians. Theodosius accompanied his father in his British campaigns, but after his murder retired to his estate in Spain. From this retreat he was summoned by Emperor Gratianus, who made him his fellow-ruler and intrusted him with the government of Thrace, Dacia, Macedonia, Egypt and the east. Here he found himself face to face with the dreaded Goths, whom his army dared not confront in the open field. By bribes and promises he succeeded in making peace with them; and the magnificent funeral-honors paid to Athanaric, their king, who died at Constantinople, so pleased the Goths that many served in his armies. On behalf of Valentinian II, his brother-in-law, he conquered Maximus, the usurper, and in 392, when Valentinian was strangled by Arbogastes, his general, Theodosius a second time marched on Rome, defeated Arbogastes and became master of the whole Roman world. He had hardly won this vast power, when he died at Milan, Jan. 17, 395.

Theophrastus (*thē'ō-frăs'tus*), a Greek philosopher, born at Eresus, Lesbos, about 372 B. C., died in 288 B. C. He was the disciple of and successor to Aristotle, and for 35 years presided over the Peripatetic school or teaching and disputing school of logicians, who, as they talked, perambulated along the walks of the Lyceum at Athens. Theophrastus was noted for his observational and scientific habits and for his early contributions to botanical science. Though a member of the Platonic circle at Athens, he specially interested himself in researches about plant-life and left a *History of Plants* and the remains of a work dealing with the *Principles of Vegetable Life*. He also wrote a series of sketches of character, which have been taken as models by modern writers.

Theos'ophy, a knowledge of divine things, concerning God and the deeper mysteries in relation to man and nature, having its early source in India and in our day erected into a sort of philosophic system, taught and supposed to be got at by extraordinary illumination. Theosophy to-day has its societies, with a widely extended organization in many countries abroad and at home, treating of soul-science, reincarnation, esoteric matters and what in general is termed occultism. According to the devotees of theosophy much of what they hold and teach formed part of the ancient systems known as Brahamism, Buddhism, Pythagoreanism, as also of the Greek mysteries, the Roman worship of Isis and of later eclectic philosophies, including the mystic teaching embraced in the Jewish Cabbala In this country theosophy was first propagated by Madame H. P. Blavatsky, a Russian lady, in 1873. Two years later, in conjunction with Colonel H. S. Olcott and Wm. W. P. Judge, she founded a society in New York City, with headquarters subsequently opened at Adyar, Madras, India. The objects of the society were to form "a nucleus of the universal brotherhood of humanity;" "to encourage the study of comparative religion, philosophy and science; and to investigate unexplained laws of nature and the powers latent in man." The society has affiliated organizations in almost all countries, and in the United States it to-day has 69 churches, with 2,663 members. Much literature has been published, including Blavatsky's *Isis Unveiled;* Besant's *Reincarnation* and *Karma;* and Sinnett's *Esoteric Buddhism.*

Theresa (*tē-rē'sȧ*) or **Teresa** (*tā-rā'sȧ*), **St.,** was born at Avila, Spain, March 28, 1515. She was noted for her piety when a child, and, when only seven, with her little brother she ran away from home to gain the crown of martyrdom among the Moors. She entered a Carmelite convent at 20, and later founded the order of Barefooted Carmelites. Her reform had the support of the pope, and during her life 29 convents of the reformed order were opened. Theresa was made a saint by Gregory XV, and her feast day is Oct. 15. Her letters and treatises, besides being considered by Roman Catholics as among the most precious of their writings, have also gained a place among Spanish classics. St. Theresa died on Oct. 4, 1582. See her *Life* by Dalton.

Ther'mograph, a device for automatically recording the variations of temperature in a room, factory or greenhouse by means of dials electrically connected with registering thermometers in the building or apartment where the tests of temperature are to be made. The thermograph not only registers the fluctuations in the temperature in a room, but serves incidentally as a fire-alarm, since it is made to sound a gong when the instrument records a temperature exceeding 100° F. See THERMOSTAT.

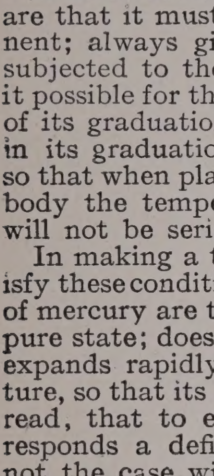
Thermom'eter, an instrument for measuring temperature. There exists a great variety of thermometers based upon a great variety of principles. But those which are most frequently used are dependent upon the fact that the volume of a fluid changes when its temperature changes. For ordinary temperatures the most important thermometers are those which employ mercury or some gas (generally air or nitrogen) as the expanding fluid. (For the measurement of high temperatures see PYROMETER.)

THE MERCURIAL THERMOMETER

The principle of the mercurial thermometer is that mercury when heated expands more than glass. If, therefore, a glass-tube having a bulb blown at one end be partially filled with mercury and immersed in a bath at a higher temperature than its own, the mercury will rise in the tube. If the bath have a lower temperature, the mercury will fall. If the mercury neither rise nor fall we may fairly conclude that the mercury and the bath are each at the same temperature. The essential features of a good thermometer are that it must be easily portable; permanent; always give the same reading when subjected to the same temperature; render it possible for the user to test the correctness of its graduation and determine any errors in its graduation; and be relatively small, so that when placed in contact with a second body the temperature of the second body will not be seriously affected.

In making a thermometer which will satisfy these conditions, the peculiar advantages of mercury are that it is easily prepared in a pure state; does not wet glass or stick to it; expands rapidly with changes of temperature, so that its changes in volume are easily read, that to each particular volume corresponds a definite temperature, which is not the case with water; and that it does not freeze except at temperatures comparatively low, and does not boil except at temperatures comparatively high.

The accompanying figure illustrates the four principal steps in the manufacture of an ordinary mercurial thermometer. First, a piece of thick-walled, capillary tubing of uniform bore is selected; a bulb is then blown on one end of this tube, after which the bulb is filled with mercury. It is then highly heated and "sealed off" The last step is the graduation of the tube of the thermometer.



Four stages in the manufacture of a mercurial thermometer.

Now it happens that there are two temperatures which are easily reproduced in the laboratory. These are the temperatures of melting ice and boiling water. On the centigrade scale the first of these is called 0° and the second 100°. The apparent change of volume between these two points is divided into 100 equal parts, each indicating *one degree.* On the Fahrenheit scale th; interval between melting ice and boiling water is divided into 180°, the lower temperature being called 32° and the higher temperature 212°. For the *gas thermometer* the student is referred to Preston's *Theory of Heat*, Sec. II. See TEMPERATURE.

Thermopylæ (*thĕr-mŏp'ĕ-lē*), a famous pass leading from northern to central Greece, between Mt. Œta and an impassable marsh on the edge of the Maliac Gulf. The pass narrows at each end to the width of a single wheel-track, forming the eastern and western gates. Here King Leonidas (*q. v.*) of Sparta made his famous stand against the mighty army of Xerxes in 480 B. C. Learning that a Thessalian had betrayed to the Persians a path over the mountains to his rear, he sent away all his troops, which numbered some 7,000, except 300 Spartans, 700 Thespians and 400 Thebans. This chosen band made a sally and perished to a man. But one Spartan who was too sick to fight, escaped, only to meet the scorn of his countrymen on his return home.

Ther'mostat, Elec'trical, is an instrument for giving an alarm when the temperature rises to a point where the instrument completes the circuit, or when it falls to a point to produce a similar result. They are used in stoves, hothouses, dwellings and wherever uniform temperature is of vital importance. They are also used as maximum thermometers or fire-alarms. Various devices are employed, the simplest being the ordinary mercurial thermometer, the upper end of the tube not being hermetically sealed, but closed by an airtight cork of rubber, through which passes a metallic rod that can be raised or lowered in the tube. Whenever the expanding mercury reaches the tip of the rod, an electric current is closed and the alarm sounded. This alarm-current may be arranged so as to set off an electromagnet which will open or close a register or regulate the draft in the furnace. See THERMOGRAPH.

Thermotropism (*thĕr-mŏt'rō-pĭz'm*), the sensitiveness of a plant to heat coming from one side, in response to which the rate of growth is so unequally affected as to cause the part to bend toward or away from the source of heat; *e. g.*, corn-seedlings and hyacinth-leaves bend toward a warm iron-plate (30°C) placed near them; cress-seedlings turn away from it. See GROWTH and IRRITABILITY.

Theseus (*thē'sē-ŭs*), a famous Greek hero, said to have been the son of Ægeus, king of Athens. His most noted exploit was his offering himself as one of the youths yearly delivered to the Cretan minotaur, for the purpose of killing that monster. Ariadne, daughter of King Minos of Crete, fell in love with him and gave him a sword and a clue of thread, with which he killed the minotaur and escaped from the famous labyrinth. The fatal ship which carried the tribute youths always carried black sails. Theseus had promised his father to hoist white sails if successful in his undertaking. This was forgotten, and the king, thinking his son killed, threw himself into the sea. Theseus became king. He is said to have waged was

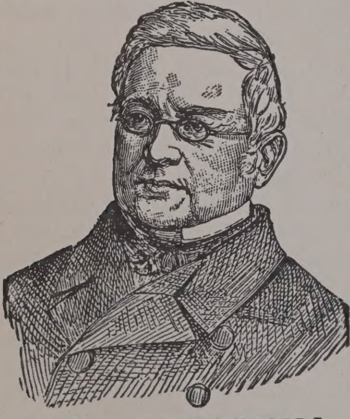
against the Amazons and the Centaurs, to have been one of the Argonauts, to have taken part in the Calydonian hunt, and to have carried off Helen from Sparta when she was only nine years old. For this he was attacked by Castor and Pollux, was driven from his throne by a revolt of the Athenians, and was killed by treachery.

Thes'saloni'ca. See Saloni'ca.

Thes'saly, the largest state of ancient Greece, reaching from Thermopylæ to the Cambunian mountains and from Mt. Pindus to the Ægean. But often the name was applied only to the Thessalian plain, which was surrounded by mountains and was the most fertile part of Greece. The plain was divided into two parts, Upper Thessaly the chief city of which was Pharsalus, and Lower Thessaly, having Larissa as its main city. The Thessalians were said to have emigrated from Epirus. There were three classes in the country: the rich land owners; Achæans and other conquered tribes; and serfs, who probably were the first dwellers in the land. In early times wars were carried on with the Phocians. About 400 B.C., under the tyrants Lycophron, Jason and Alexander, Pheræ became the foremost city and brought all Thessaly under its rule. Thessaly fell successively into the hands of the Macedonians, Romans and Turks. Part of it now belongs to Greece See Grote's *History of Greece* and Fyffe's *Primer of Greek History.*

The'tis. See Achil'les.

Thian-Shan or **Celestial Mountains** are a chain in Central Asia, which extends from Pamir Plateau eastward as far as southern Mongolia. Some of the peaks attain the great height of 24,000 feet. There are a few extinct volcanoes in the range, and among the most typical rocks in its formation are granite, schist and limestone. On its western side the Thian-Shan chain subdivides into several ranges which are set in a fan-like formation.



LOUIS ADOLPHE THIERS

Thiers (*tyâr*), **Louis Adolphe,** a French statesman, was born at Marseilles, April 16, 1797, the son of a locksmith. After attending the lyceum at Marseilles, he studied law at Aix. He then went to Paris to seek his fortune, and after a hard struggle with poverty became a newspaper writer and soon was widely known. But it was his popular *History of the French Revolution* which carried him from his garret in an out-of-the-way alley to fame, both as a writer and in politics. In 1830 he established a new democratic paper, *The National,* which greatly helped to bring about the revolution of 1830. Thiers at once became one of the ablest debaters in the chamber of deputies. He was minister of the interior in 1832, later was minister of commerce and agriculture, and in 1836 prime minister. A disagreement with the king in regard to the fortification of Paris led to his resignation and gave him the opportunity to begin his *History of the Consulate and of the Empire,* adding to his material by visiting England and personally inspecting the battlefields of Germany, Italy and Spain. He still was an acknowledged leader in politics, and protested against French union with England in her objections to the annexation of Texas, being unwilling, he said, to act against "the great American nation, the harbinger of French liberty." After the revolution of 1848 he became prominent in the assembly, supporting Louis Napoleon as president but warning the nation in vain of the danger of a new empire, thus causing his imprisonment and exile at its establishment. His return to the assembly was marked by his great speech against the enormous outlay in the Italian War and the expedition to Mexico and in improving the city. In 1870 he predicted defeat in the Franco-Prussian War, and, as chief of the executive, was successful in procuring a treaty of peace, in crushing the Commune (*q. v.*) and in carrying out a national loan for paying the German indemnity. He was given the title of president on Aug. 31, 1871, and succeeded in obtaining the withdrawal of German troops from French soil, but resigned in 1872. He was gathering material for a history of art and was writing his memoirs, when he died near Paris on Sept. 3, 1877.

Thirty-nine Articles, The. The public standard of religious belief adopted by the Church of England. Their principles developed from 1534, when papal authority was thrown off by the English church, till 1582, when Convocation added its sanction. Next year they were published by royal authority. The articles are not intended to be a complete system of theology, but only to enumerate certain truths of such primary importance that denial of one is sufficient ground for exclusion from the church. They were framed for the establishment of consent regarding true religion, and treat of the doctrine of the trinity (Arts. 1-5); the sources of knowledge of religious matters (Arts. 6-8); sin and redemption (Arts. 9-18); and necessary relations of Christians as members of a religious community (Arts. 19-39). They were adopted by the General Convention of the American Episcopal Church in 1801, the Athanasian creed being excluded. In 1784, under Wesley's advice, the Methodist Episcopal church revised and adopted 25 of them.

Thirty Tyrants, The, were the body of aristocrats who governed Athens in the period after her defeat by Sparta in 404 B. C. The chief of these tyrants was Critias. They were chosen by the Spartans, who hoped to govern Athens by setting the aristocratic above the hitherto dominant democratic party; but in 403 they were overthrown by Thrasybulus and the Athenian exiles who returned with him. A secondary usage of the name occurs in Roman history, as applied to the military commanders who terrorized various parts of the Roman empire during the anarchical reigns (A. D. 253-68) of Valerian and Gallienus.

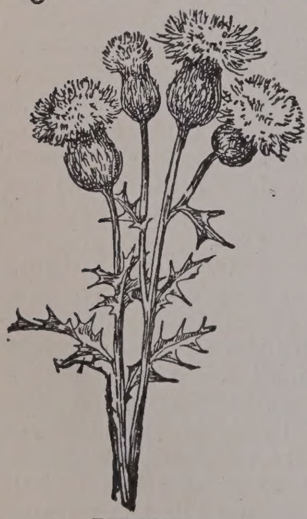
Thirty Years' War (1618-48), a terrible, continental struggle in Central Europe partly religious and partly political, which involved Germany and Austria, Bohemia, Denmark, Sweden and France. The war had its origin in 1618 in Bohemia, which, from being an elective monarchy and since the days of Huss and Jerome of Prague strongly Protestant, had come into the possession of the Roman Catholic house of Hapsburg, which ruled it despotically. In 1609 Rudolph, king of Bohemia and son of emperor Maximilian II, was forced, though under the influence of the court of Spain, to grant religious freedom to the Bohemian Protestants; but having in 1611 been intrigued against by his brother Matthias and displaced by him from the throne, the latter violated the concession made by Rudolph. The Bohemians retorted by throwing the imperial commissioners out of a window in the Hall of Regents, insisted on their rights as Protestants, and proceeded to fight for their religious privileges. The forces then arrayed against Protestantism were those of the House of Austria, which feared to lose its territories by the conflict impending, and those of the Catholic League, at whose head was the Duke of Bavaria, whose country was in the war that followed ravaged by the Swedes and French. In 1619 Emperor Matthias died, and was succeeded by Ferdinand II; him, however, the Bohemians would not accept, but chose a rival in the person of Frederick V. Elector of the Palatinate, son-in-law of James I of England. This action dispelled all hope of reconciliation between Bohemia and Austria, and the war, aided by the Duke of Savoy, was proceeded with under Thurn and Mansfeld; but, though Bohemia at first met with some successes, its forces were hard pressed by those under Count Tilly, who commanded the troops of the Catholic League and in November of 1620 met the elector's army at White Mountain, outside the walls of Prague, and there defeated and routed it the elector barely escaping capture. Frederick, though he found refuge at The Hague, was deposed and lost his dominions; but Mansfeld and the Protestant party in Bohemia continued the war; which was now (1625) joined by Christian IV of Denmark, who for the time became leader of the Protestant rising in northern Germany. He however, met with defeat at the hands of Count Tilly at Lutter in Brunswick (Aug. 27, 1626); Mansfeld also suffering defeat in the previous April by Wallenstein, the imperial general, at the bridge of Dessau in Anhalt. After this the whole of Silesia was dominated by the forces of the league, while Tilly and Wallenstein, joining their armies, pursued the Danes to the far north; and presently the whole of Schleswig and Jutland, save a few fortified towns, fell into their hands. Of these, the northern seaports of Stralsund and Glückstadt heroically held out against their besiegers; but Denmark, having had enough of the war, concluded with Ferdinand II the peace of Lübeck (May 22, 1629), Christian receiving back all his hereditary possessions and resigning all claim to the bishopric held by his family within the Holy Roman Empire. In the following year Wallenstein was dismissed by his master, owing to repugnance at the excesses of his soldiery, complained of at a meeting of the electors of the empire at Ratisbon.

At this juncture a new period of the Thirty Years' War is entered, by the intervention of Sweden and the appearance of Gustavus Adolphus (*q. v.*), the great Swedish king and soldier, of the royal house of Vasa. Gustavus had just concluded an armistice with Poland, through the mediation of Richelieu. Being loyal to the principles of the Reformation, he ardently intervened in the struggle between Roman Catholicism and Protestantism. Unfortunately his career was a short one, for he fell at Lützen (Nov. 16, 1632), though not before his Swedes were victorious over Wallenstein (who had been reinstated in command), and he had beaten Tilly at Breitenfeld with frightful loss to the Austrians. Despite the death of the Swedish king the war went on, Bernhard of Weimar, the companion of Gustavus, leading the Protestants, and Wallenstein commanding the imperial troops. With the religious objects of Ferdinand II and the Catholic League Wallenstein, however, had little sympathy; his object was rather that of selfish aggrandizement. Seeing that to be the case, a conspiracy was formed against him, which led to his assassination, inspired by Spanish gold. This occurred on Feb. 25, 1634.

Wallenstein's removal marks a turning point in the war for it now ceased to be a purely German and Protestant struggle. "In the course of years the German contest had come to involve all the rivalries and enmities which then agitated Europe: the quarrels of Sweden and Poland, the jealousy of Denmark against its northern neighbor, the struggle of Spain to reduce the Dutch into subjection and, above all, the enmity between France and Spain, which dated back to the time of Charles V. It was these foreign interests that prolonged the war for the next 13 years."

At this juncture France comes upon the scene, taking the side of the Protestant powers of Germany at the very period when she was persecuting her own Protestant subjects. The reason, however, was not only her desire to crush the power of the house of Hapsburg, ascendant then both in Spain and in Austria, but, among other objects, to secure possession of Alsace and Lorraine for France and the empire. This was the motive and ambition of Richelieu, who coveted the Rhine provinces. Meanwhile, though the war had been maintained in the Protestant interest by Bernhard of Saxe-Weimar, the latter met with a sanguinary defeat (Aug. 27, 1634) at Nördlingen in Bavaria; and by the following spring the whole of southern Germany was in the hands of the imperialists. In spite of this check Bernhard and the Swedes continued the struggle, and four years later he defeated the imperialists at Rheinfelden, and captured Breisach. While these events were happening, Ferdinand II died and was succeeded by Ferdinand III who pursued the same ultramontane policy; and Bernhard himself also died. France and Sweden meanwhile prosecuted the terms of their alliance, the French invading the Spanish Netherlands; the Dutch destroyed a Spanish fleet; and Portugal, taking advantage of an insurrection in Spain, regained independence. The end now came in sight, for France on the Rhine had Condé and Turenne, the great generals, at the head of her armies, and Mazarin had succeeded Richelieu as French prime minister. Condé defeated the Spanish at Rocroi near the Belgian frontier; and at Allerheim he routed the imperialists (Aug. 3, 1645). Turenne, on the other hand, effecting a junction with the Swedish army, with it invaded Bavaria and overthrew Maximilian, who had been one of the chief organizers of the Catholic League. The war terminated with the peace of Westphalia (Oct. 24, 1648) and the occupation by the Protestant army of Prague, where the struggle had had its commencement. The gains of the war fell chiefly to France and Sweden; while Lutherans, Calvinists and Catholics alike were accorded religious freedom. But Germany did not recover for 200 years.

G. M. A.

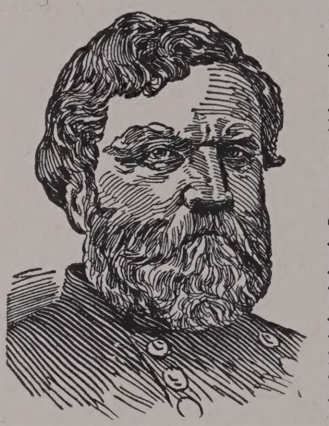


THISTLE

Thistle (*this″l*), the name of species of certain genera of the composite family, popularly characterized by being stout and spiny. The genus to which the common thistles belong is *Cnicus*. Some of them are among our worst weeds, and their seed-like fruits (akenes) with plumy tufts of soft hairs are wafted everywhere on currents of air. The well-known Canadian thistle (*C. arvensis*) is wrongly named, as it is a noxious weed from Europe.

Thom'as a Kem'pis. See Kempis.

Thomas, Saint, one of the 12 disciples of Christ, is rarely mentioned in the New Testament. He is called doubting Thomas, as he refused to believe in the resurrection of Jesus until he had seen and touched Him. According to various accounts he preached either in Parthia, Egypt, Ethiopia or India.



GEORGE HENRY THOMAS

Thomas, George Henry, an American general, was born in Southampton County, Va., July 31, 1816. He was graduated from West Point in 1840, W. T. Sherman being a member of the same class. He served in the Seminole and Mexican Wars, and later was appointed a professor at West Point. For six years he was in service in California and Texas. On the outbreak of the Civil War he remained loyal to the Union, and was made a brigadier-general. He served first in the valley of Virginia, but was soon sent to Kentucky and placed in command of a division. Here in Jan., 1862, he defeated the Confederate forces under Zollicoffer, and was promoted to major-general. In the hard-fought battle of Stone River, Tenn., he rendered distinguished service, showing his characteristic staying qualities. In the battle of Chickamauga, when the Union right was routed and Gen. Rosecrans gave up the field for lost, Thomas, who was in command of the left, held his position against the repeated onslaughts of the victorious Confederates, thus saving the army and earning the title of The Rock of Chickamauga. In the battle of Missionary Ridge Thomas with the army of the Cumberland held the Union center, which carried the enemy's intrenchments, scaled the heights and took the Confederate lines on the crest. Thomas rendered conspicuous service in the Atlanta campaign, which ended in the capture of that city. When Sherman started on his march to Savannah, Thomas was left to oppose the Confederate army under Hood, who moved west and north toward Nashville. While concentrating his forces at Nashville, Thomas sent Schofield to check Hood's advance, resulting in the hard-fought battle of Franklin. When Hood appeared before Nashville, Thomas delayed to attack him, taking time to organize and equip the detachments which had come to him from different points. Fault was found with him for his slowness to act; but when he finally attacked and routed Hood's army on Dec. 16, 1864, winning one of the most important victories of the war, his wisdom and sagacity were fully vindicated. He received the thanks of President Lincoln and of Congress, was promoted to be major-general in the regular army and received a gold medal from Tennessee. After the war General Thomas was in charge of several military districts. He declined the rank of lieutenant-general which was offered him, saying that he had done nothing since the war to merit promotion. He died at San Francisco, March 28, 1870.

Thomas, Miss M. Carey, President Emeritus of Bryn Mawr (Pa.) College. She was born at Baltimore, Md., Jan. 2, 1857. A.B., Cornell, 1877; studied at Johns-Hopkins 1877-8, University of Leipzig 1879-83; Ph.D., Zurich, 1882. Dean of Bryn Mawr College 1885-94; president, 1894-1922. She was the first woman trustee of Cornell.

Thomas, Theodore, American orchestra-leader and conductor of the Chicago orchestra, was born at Esens, Hannover, Germany, Oct. 11, 1835, and came to the United States in 1845. He studied music assiduously and made his *début* as a solo violinist, afterward taking part in concerts and on tours in various parts of the country. In 1864 he inaugurated orchestral concerts, and three years later organized the Thomas orchestra. He subsequently became conductor of the Brooklyn and New York Philharmonic Societies, and on his removal in 1891 to Chicago he became conductor of an orchestra there and was musical director of the Columbian Exposition in 1893. He conducted notable musical festivals at Cincinnati in successive years, as also at New York and Chicago, and did much to further the interests of music in America and develop public taste for it. He died on Jan. 4, 1905.

Thom'asville, Ga., a city, the seat of Thomas County, on the Atlantic Coast and Atl. and Birm. railways, about 200 miles southwest of Savannah. It is an attractive winter-resort, with several large hotels, and is in an elevated, picturesque region, producing varied fruits, including figs, melons and grapes; while cotton, and tobacco are local staples. Its industries embrace cotton-compresses, carriage-works, planing-mills, creameries, a basket-factory and lumber-mills. It owns and operates its own water-works and electric-light plant, and has a city hospital and a public library, several educational institutions, including South Georgia College, Yoning Female College, and the Vashti Home for Girls. Population 10,000

Thomp'son, Sir Benjamin, better known as Count Rumford, a brilliant engineer, statesman and soldier, born at Woburn, in Massachusetts, 1753; died at Auteuil, a suburb of Paris, in 1814. He appears to have been well-educated in spite of the fact that he largely was self-educated. Being an English sympathizer, he went to England at the outbreak of the American Revolution. Here he rapidly advanced in the state department. In 1779 he was elected fellow of the Royal Society. At the invitation of a Bavarian prince he went to Munich in 1783, where he remained for 11 years as minister of war and minister of police. During this period, while superintending the construction of cannon at the arsenal, he made a series of experiments which led him to think that heat is not an imponderable fluid, but a form of energy. He, therefore, is justly called one of the founders of the mechanical theory of heat. At Munich he was made Count Rumford. He and Sir Joseph Banks took part in the establishment of the Royal Institution in London. Rumford's second wife was the widow of Lavoisier, the distinguished chemist.

Thompson, Launt, an American sculptor, was born in Ireland in 1833, but was brought up in Albany, N. Y. He was nine years in Palmer's studio in Albany, where his bust of *Little Nell* made him well-known. A statue of General Winfield Scott, at the soldiers' home near Washington, a soldier's monument at Pittsfield, Mass., a colossal statue of Napoleon and a statue of the first president of Yale on the college grounds are some of his larger works. He died at Middletown, N. Y., Sept. 26, 1894.

Thompson, Richard Wigginton, an American politician and ex-secretary of the United States navy, was born in Culpeper County, Va., June 9, 1809, and died at Terre Haute, Ind., Feb. 9, 1900. When a young man, he was a clerk in Louisville, Ky., but afterwards moved to Lawrence County, Ind., where he studied law and was admitted to the bar. In 1834 he became member of the state legislature and later of the senate, acting for a time as president of the senate and lieutenant-governor. In 1841 he was elected to Congress, serving for several terms, and for a time was judge of the fifth Indiana circuit. In 1877 he entered Hayes' cabinet as secretary of the navy, and became chairman of the American Committee of the [French] Panama Canal Company. He wrote *History of the Tariff*, *The Papacy and the Civil Power*, *Footprints of the Jesuits* and *Personal Recollections of Sixteen Presidents.*

Thom'son, James, a British poet, was born in Roxburghshire, Scotland, Sept. 11, 1700. He studied six years at Edinburgh. His fame rests upon his poem, *The Seasons. Winter* appeared in 1726, followed by *Summer* (1727), *Spring* (1728) and *Autumn.* He wrote several dramas, *Agamemnon, Edward and Eleonora,* and *Tancred and Sigismunda.* The *Castle of Indolence,* next to *The Seasons* his best-known work, was written in 1748. The song *Rule! Britannia* is found in a masque, *Alfred,* written by Thomson in connection with Mallet. He died near Richmond, England, Aug. 27, 1748.

Thomson, Joseph John, a very eminent English physicist, who has since 1884 occupied the most important chair of physics in Great Britain, that of *Experimental Physics* at Cambridge University. He was born near Manchester, Dec. 18, 1856; was educated at Owens College and at Trinity College, Cambridge, where he graduated as second wrangler and second Smith's prizeman in 1880. His work has been of profound character. Aside from numerous contributions to periodical literature, the following works give some idea of his activity: *Treatise on Vortex Motion; Application of Dynamics to Physics and Chemistry;* and *Recent Researches in Electricity and Magnetism.* In 1899 he achieved the division of the hydrogen atom. By a clear and logically connected series of experiments he split a small part from the hydrogen atom, which he calls a corpuscle. It has a mass of only one-thousandth of that of the hydrogen atom. For a popular account of this work consult *The Astrophysical Journal,* Vol. XI., pp. 170–4 (1900). See Atom and Hydrogen.

Thomson, Sir William. See Kelvin, Lord.

Thor (*thôr* or *tôr*), in Scandinavian myth, was the oldest son of Odin and Frigga and was the god of thunder. He ruled winds, seasons and agriculture. The *Eddas* speak of him as the champion of gods and men, hurling his thunderbolts at his enemies,—the monsters and giants. His weapon was an enormous hammer, which, after it was thrown, came back into his hand. He never grew weary. No matter how much strength he spent, it was renewed by a magic belt which he wore around his waist. Thursday is named from Thor.

Thoreau (*thō'rō*), **Henry David,** was born at Concord, Mass., July 12, 1817. He graduated at Harvard College in 1837, and became a surveyor. He lived the simplest of lives, spending most of his time in long tramps through the woods, in the study of nature and in writing. Emerson says of him: "He was bred to no profession; he never married; he lived alone; he never went to church; he never voted; he refused to pay a tax to the state; he ate no flesh; he drank no wine; he never knew the use of tobacco; and, though a naturalist, he used neither trap nor gun." This poet-naturalist built with his own hands a small cabin on the banks of Walden Pond near Concord, and lived there by himself for two years. His expenses during these years were nine cents a day, and he gave an account of his experiences in perhaps his finest book, *Walden,* published in 1854. Others were *Cape Cod, The Maine Woods* and *A Yankee in Canada.* No one else has lived so close to nature or so written of it. He died at Concord, May 6, 1862 See *Thoreau the Poet-Naturalist* by Channing and Sanborn's *Thoreau* in The American Men of Letters Series.

Thorn, a conspicuous rigid and sharp structure of plants. Thorns may be transformed leaves or branches, and are most extensively developed by plants of the arid regions.

Thorwaldsen (*tôr'wald-sĕn*), **Albert Bertel,** one of the greatest of modern sculptors, was born probably at Copenhagen, Nov. 15, 1770. When asked where he was born he said: "I don't know, but I arrived at Rome on March 8, 1797," thus dating his birth, as it were, from the beginning of his career as an artist. He was a son of a poor ship-carpenter, and first carved figureheads in the shipyard where his father worked. He had little schooling, and always was a poor writer and speller, but by 1793 he had gained a gold medal for a design and with it a chance to study abroad for three years. Only after long and hard study did he at last (1803) gain recognition by his *Jason,* but from this time he prospered. His return to Denmark in 1819 was triumphal and his reception almost royal. But a year later found him back at Rome, which he made his home. Thorwaldsen died on March 24, 1844, leaving to his country most of his great works and the bulk of his fortune, with which to build a museum where they should be kept. Of his many busts that of Byron is one of the finest. His famous *Christ and the Twelve Apostles* is in the cathedral of Copenhagen. See his *Life* by Plon.

Thrace (*thrās*), in ancient times the name of a country bounded by the Danube, the Euxine and Ægean Seas, Macedonia and Illyria. Roughly speaking, ancient Thrace, before the rise of the Macedonian power, embraced the territory now divided into Rumelia and Bulgaria. Under the Romans it included only the part south of the Hæmus or Balkan Mountains, while the northern part was called Mœsia. It was a mountainous country, the chief range being the Hæmus or, as it is now called, the Balkans, the highest peaks of which are over 8,000 feet above the sea. It was marshy and undrained, covered with deep forests of fir, oak, chestnut etc., but parts of it, as the great plain of Adrianople, were very fertile; cattle, sheep, horses and swine were kept; and the chief products were wheat, millet, hemp and wine. Its gold and silver mines led to conquest by Philip of Macedon and by Lysimachus. Who the early Thracians were is not known. They were not Greeks, and they lived by robbery and war. The Greeks first heard of them through their coastal colonies, the chief of which was Byzantium. But the interior of Thrace kept its independence, except for a short time when conquered by the Persian general Megabazus, until conquest by Macedonia. In 168 B. C. it became Roman territory, was colonized by Sarmatians and Goths, overrun by Attila and Alaric, and conquered by Amurath the Turk in 1353.

Thrasher. See Thrush (Brown).

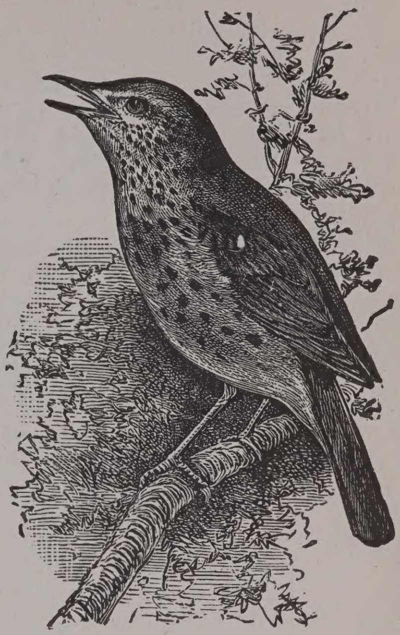
Thread, a twisted filament of flax, wool, cotton, silk or other fibrous substance, making a fine, strong and well-rounded as well as lengthy line for sewing with. For the operation of drawing out and twisting into thread see Spinning.

Three Rivers, Can., county-seat of Maurice County, Quebec, is on St. Lawrence River at the head of tide-water and where the St. Maurice divides before entering the greater stream. It extensively manufactures the bog-iron found near by and does a large trade in lumber. It was founded in 1634. The population is 9,981.

Thresh'ing Machine', a machine or apparatus for beating out the seed of grain and separating it from the straw. In recent and more perfect machines, besides the grain-conveyer which carries the grain, chaff and short straws by an oscillating motion to the sieves in the shoe, where it is cleaned by the fanblast, there usually are attached operating grain-weighers, measurers, tailings, elevators and baggers, in addition to self-feeders, automatic band-cutters and other mechanically operated and labor-saving devices. The perfection reached to-day by the modern type of American thresher is indicated by the fact that, where driven by an engine of 15 or 20 horse-power, as many as 4,000 bushels a day are threshed, with the best and most satisfactory results in separating the grain from the straw.

Throwing the Hammer. See Putting the Shot.

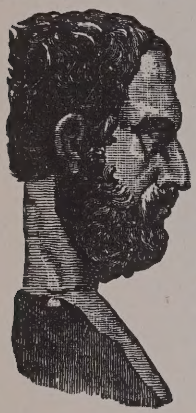
Thrush, the common name for any bird belonging to the genus *Turdus*. Thrushes occupy the highest rank in the class of birds. They belong to a large family which embraces about 300 species found in most parts of the world. They usually are fine singers. The eastern hemisphere has a larger number of varieties than the western one. Our familiar robin is a thrush. Of the various thrushes common in the eastern United States all, save the robin, have plain, brown backs and spotted breasts. The wood-thrush is the best known. It is a bird about two inches shorter than the robin, cinnamon brown above with a whitish breast spotted with very distinct dusky spots. As its name indicates, it is a bird fond of woods, but will perch and sing in maples and elms on quiet village-streets. Its voice is flute-like and its song lively and engaging. It nests in woodland and in shrubbery about a house, builds a nest closely resembling that of the robin but somewhat deeper, the materials being leaves, roots, weed-stems, mud, bits of cloth and paper. There are three or four (rarely five), greenish-blue eggs. It is also known as the song-thrush, and corresponds to the song-thrush of Europe, which is a little larger but otherwise like our wood-thrush. The hermit-thrush is a northern bird smaller than the wood-thrush. It seldom nests south of Vermont or northern Michigan, and extends northward to the Arctic regions. It is not often seen, but the song of this shy bird is of rarest beauty. Wilson's thrush or the veery ranges between the two in nesting habits, not extending so far north as the hermit nor so far south as the wood-thrush. It seldom nests south of 40° N. It is one of the smaller thrushes, and utters a song of much sweetness, its voice sometimes being heard at night. The brown thrasher, also called brown thrush and ground-thrush, is the "merry, brown thrush sitting up in a tree." This bird is longer than the robin, of slender build, red-brown above, underneath white spotted with dark brown; its tail is very long. In the manner of using the tail to



WOOD-THRUSH

give expression to its feelings it shows itself a true cousin to the wrens, but variously shows relationship to the true thrushes. This bird is widely distributed, a familiar summer resident, its joyous song familiar and well-prized. The nest is built in the ground or in a low bush. It is a bulky structure of twigs, rootlets and leaves lined with horse-hair and feathers. The brown thrasher is accused of being a fruit-thief, but in return for tribute levied he destroys many baneful insects. The jolly lay is poured forth from topmost branch of thickset haunt.

Thucydides (*thū-sĭd′ĭ-dēz*), the great historian of the Peloponnesian War, was an Athenian, born probably in 471 B. C. He owned gold-mines in Thrace, and was one of the few who recovered from the terrible plague at Athens. He was in command of an Athenian squadron in 424, when summoned to Amphipolis to save it from falling into the hands of the Spartans, but arrived on the evening of the day on which the place surrendered. For this failure Thucydides was exiled. According to his own account this exile lasted 20 years. It seems certain that he died a violent death, but when or how is not known. Hardly any literary work has received higher praise than the great work of Thucydides. It is remarkable for its truthfulness and for the short, simple and realistic way in which he has recorded facts that must have taken months to gather, sift and decide upon. Macaulay repeatedly said that no historian need ever hope to equal Thucydides. See Fyffe's *Primer of Greek History.*



THUCYDIDES

Thug, meaning a cheat, is the name of a religious brotherhood in India, which in honor of the goddess Kali commits murders and lives chiefly from the plunder got from its victims. Thugs usually band in gangs of ten to fifty or more, and travel, if wealthy enough, on horseback with tents, under the guise of traders. Each gang has its leader; its teacher; its entrappers; its stranglers; and its grave-diggers. They inveigle travelers to join them on the plea of safety, or lie in wait for them. When the victim is strangled and robbed, his body is buried in an out-of-the-way place, and is sometimes mutilated. Thugs also infest the rivers. They are superstitious, and never commit murder unless all omens are favorable. It was not till 1831 that energetic measures were taken to stop these practices, but thuggee, as it is called, has not yet wholly disappeared.

Thur′man, Allen Granbery, an American statesman, was born at Lynchburg, Va., Nov. 13, 1813. When six years old, his family moved to Ohio. He became a lawyer and was chosen a representative in the 29th Congress. In 1851 he was made judge of the supreme court of Ohio, serving as chief-justice from 1854 to 1856. He ran for governor of Ohio in 1867. During his two terms as United States senator (1869–81) he was one of the ablest and most prominent members of that body. In 1888 Thurman ran for vice-president on the Democratic ticket with Cleveland. He died on Dec. 12, 1895.

Thyrsus (*thẽr′sŭs*), a compound raceme or panicle in which a compact, pyramidal cluster of flowers is formed, as in the lilac or a bunch of grapes. See INFLORESCENCE.

Ti′ber, a famous Italian river, rises in the Apennines, passes through Rome, and falls into the Mediterranean by two mouths near Ostia, after a course of 230 miles. Between Lodi and Passo del Forello are rapids, and here the river runs through a narrow gorge for several miles. The Tiber is navigable for ships to Rome, 18 miles from its mouth, where it is 500 feet wide, and for boats of light draught to the mouth of the Neva, 72 miles further up. The Tiber has always been noted for its yellow color, which comes from the yellow clay through which it passes Besides Rome, the chief city on its banks is Perugia. Steps have been taken to deepen and otherwise improve the Tiber's course.

Tiberius (*tī-bē′rĭ-ŭs*), emperor of Rome, was born on Nov. 16, 42 B. C. As the stepson of Augustus he was adopted by that emperor, and saw service at the head of the legions on the outposts of the empire. He was popular with Augustus, the soldiers and the people, and was married to Julia, the emperor's daughter. He ascended the throne in 14 A. D., and, according to Mommsen, was the best of the emperors. Tacitus grossly misrepresented his character and life. When power fell into the hands of Ælius Sejanus, a Roman knight and a commander of the Prætorian guards, a man of ability, Sejanus ruled well, though he murdered leading citizens, pouring tales of conspiracy into the ears of Tiberius. But Sejanus could not hide his ambition to become emperor in name as well as fact, and fell in 31 A. D. There has been an almost complete reversal of the unjust verdict of history on Tiberius. It is recognized that he ruled the people well, though the Roman court suffered injustice at his hands in retaliation for the disloyalty of the old aristocracy. Consult Mommsen's *Roman Provinces;* Beesley's *Catiline, Clodius and Tiberius;* Duruy's *History of Rome,* and Tarver's *Tiberius.* It was in the reign of Tiberius that Christ was crucified at Jerusalem. The emperor died on March 16, 37 A. D.

Tibet or Thibet (*tĭb′ĕt*) **is the south-eastern portion of the vast central plain of**

Asia, between 28° and 36° N. and 79° and 103° E. It lies between Chinese or East Turkestan on the north; China proper to the east; Bhutan, British Hindostan and Nepal on the south; and Kashmir in the west. Thus it extends eastward from the Pamirs (*q. v.*) between the Himalayas and the Kwen-Lun Mountains to China. Strangers having been jealously excluded, wide regions remain unexplored.

Area and Surface. Estimates of the area vary from 463,200 to 812,000 square miles, the true area probably being over 700,000 square miles, while the population is variously reckoned as 2,250,000 or 6,500,000, though it more likely is about 4,500,000. The extreme length is 1,600 miles east and west, the breadth from 150 miles in the west to 700 in the east. The country is the largest and loftiest tableland on the globe. The Himalayas shut it in on the south. the Kwen-Luns on the north. The Karakoram and its spurs traverse the west, separating Tibet from Kashmir, while the Yun-Ling Mountains on the east part China and Tibet. The plateau is not level, but is dotted with peaks and ranges, 20 heights being higher than the loftiest Andes and the general height of the plains 10,000 to 17,600 feet above the sea, while the mountains rise almost equally above these plains. The Kwen-Lun sends numerous outrunners south into the plateau; eastern Tibet is traversed by somewhat parallel ranges; and in the south Hedin (*q. v.*) has discovered a range 2,000 miles long, hitherto unknown, running about west and east.

Drainage and Climate. Tibet is a mother of mighty rivers. The Brahmaputra (*q. v.*), Hoang-Ho, Indus, Irawadi, Salwin, Sampu, Sutlej and Yang-Tze-Kiang all rise in Tibet. The Karakoram Mountains enclose a valley drained by the headwaters of the Sanpu and Indus (*q. v.*), the basin of the former being Tibet proper, that of the Indus forming Ladak and Bultistan. North of the Karakoram is the large desert called Katchi in the east and Khor in the west. The Yang-Tze (*q. v.*) in the east drains the tract named Khan. The Hoang-Ho (*q. v.*) rises in the hill-country of Lake Kokonor in northeastern Tibet. Large lakes are numerous throughout the country. In the north and west the enclosed plains form poorly watered, inland drainage-basins and contain saline lakes. Tibet's extreme elevation, though it lies approximately between the latitude of Constantinople and that of New Orleans, gives it almost arctic winters. The mountains and plains rob the air of moisture on its inland journey from the oceans. whose nearest point, the Bay of Bengal, is hundreds of miles away. So the climate is excessively dry, the fluctuations of temperature great and sudden, and the northern winds in winter biting to the bone. Timber never rots, meat never spoils, wood becoming brittle and flesh drying until it can be powdered. Among the mountains huge glaciers abound, one, 32 miles long, being four times the size of Switzerland's world-famous *Mer de Glace.*

Resources. The plains, like the *steppes* of Russia and Central Asia, are used for grazing, but vegetation is scant and is that of deserts and of alpine regions. Green meadows occur only along streams, but forests of birch, coniferous trees and poplar exist on the mountains of eastern Tibet. Wild beasts abound in watered districts, and antelopes, wild asses and yaks or Tibetan oxen are numerous on the *steppes.* The fertile valleys produce fruits and grains, barley and other cereals, as, also, pulse and vegetables being grown, and some favored regions even yielding peaches and grapes. The domestic animals are the sheep and yak, but in some regions there are buffalo, camels and swine. Irrigation is necessary, and terraces are built along slopes to retain water. Borax, copper, niter, salt, silver, sulphur and tin abound; there are considerable quantities of gold, borax, gold and salt being the minerals most worked; but lack of fuel makes the development of mineral wealth slow.

Inhabitants and Industries. The people belong to a semicivilized Mongolian race akin to the Burmans They are industrious, intelligent, and skilful. Their language is not unlike Chinese, but is written in characters that express many syllables. The northern Tibetans are nomadic, but the southern ones live in houses, building them of stone or sun-dried brick. Polyandry, the marriage of one woman to many men, prevails among the lower classes. Courts of justice exist, but the ordeal or the lot often decides doubtful cases, and even torture is used in criminal cases to obtain evidence. Local conditions decide what occupations can be pursued, and in some places agriculture is carried on, whereas in other places only pastoral pursuits can be followed. Though the industries are not important, wool-spinning, weaving and knitting are common and many hands have skill in making images and decorations for temples. The people are ingenious jewelers, and make fine fabrics of goat's hair and wool. A large literature, mainly religious, has accumulated, and printing has been practised for centuries. There is a large trade with Turkestan and China; considerable traffic crosses the Indian frontier; and furs, gold, musk, precious stones and wool are exported.

Government and Religion. Tibet is a theocracy, the church being the state and the priests the real rulers, though China is the suzerain of Tibet. Chinese authority is represented by two officers, who, respectively, have charge of foreign relations and of military matters; by three commanders of the permanent Chinese garrison (about 4,600 men) at Dingei, Lhasa and Shigatse; and by a few other officials. But the administration is almost wholly in Tibetan hands. The religion is that form of Buddhism (*q. v.*) which is called Lamaism, but beside it exist the superstitions of shamanism. The priests, called *lamas*, are exceedingly numerous. At their head is a high-priest, the *Dalai Lama*, who lives in a palace near Lhasa, rules through a priest appointed for life by the Chinese government as a minister, and claims to be the head of the Buddhist world. The priests have superbly decorated temples, and their monasteries, containing thousands of inmates, resemble populous towns. The organization and ceremonies of Lamaism are so like those of the Roman church that Huc and Gabet, French missioners to Tibet in 1844–6, thought Satan had made it in mockery of the Christian church.

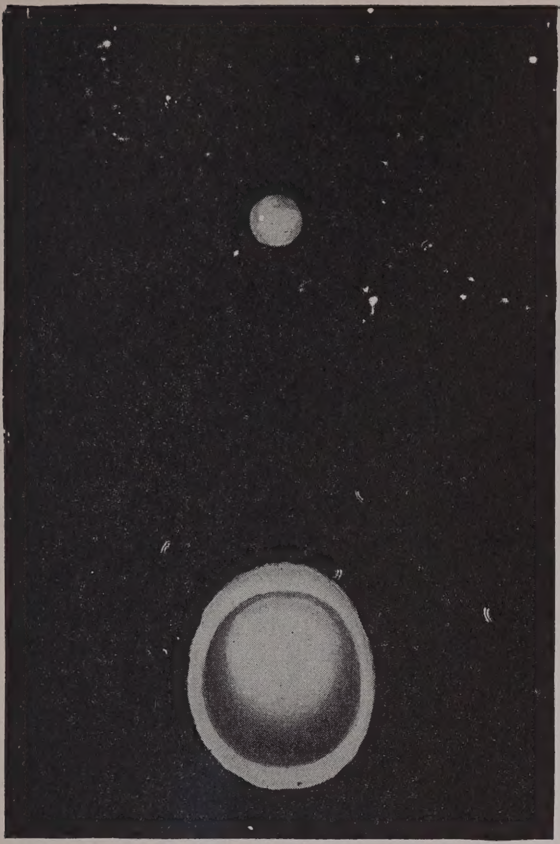
History. Tibet, with Korea and Abyssinia, has been a hermit among nations. About Christ's time Sakya, the Hindu Buddhists' last great teacher, settled at Lhasa (*q. v.*), where it is thought that he lives yet in the Dalai Lama. But the historical and formal entry of Buddhism really occurred in A. D. 622,— the very year Mohammed left Mecca. In 821 Tibet paid tribute to China. Western Tibet was overrun by Turks, till Aurungzeb in the 17th century expelled them. Odorico, an Italian friar, visited Tibet in 1328; Andrada, a Portuguese Jesuit in 1534; and Capuchin missionaries in 1708-44. Tibet became a dependency of China in 1720. The priests enforced strict exclusion of all foreigners who were not Buddhists. Russia gained influence in Tibet about 1890. In 1890 and 1893 England made Tibetan treaties with China to remove hindrances from Indian trade with Tibet. The Tibetans failing to observe the terms of the treaty, Britain in 1903–4 sent a military expedition to Lhasa. Its commander concluded a treaty with the Tibetans themselves which removed all causes of friction, the latter paying an indemnity and the English evacuating Chumbi Valley in 1908. No Tibetan territory may be sold, mortgaged or leased to any foreign power without English consent, nor Tibetan public works or affairs be subject to foreign interference or management. China assented to this in 1906, and Russia and Britain agreed in 1907 to negotiate with Tibet only through China and to send no representative to Lhasa. Consult Huc's *Recollections of a Journey to Tibet;* Landon's *Opening of Tibet;* and Landor's *Tibet and Nepal.*

Tick, a kind of mite having the mouth in the form of a sharp beak. Birds and mammals suffer especially from it. They are very common in warm countries and are parasites on cattle. The so-called sheep-ticks are insects with six legs, while all true ticks have eight legs, like the spiders. They live on plants and will attach themselves to the skin of man as well as to animals. The wood-tick is common in our woods in certain sections. Squirrels, rabbits, pigeons and chickens, — each is affected by a special tick. Eight species are found upon cattle in this country, and diseases of cattle are transmitted by the cattle-ticks. Those of South Africa and Brazil are dreadful pests. In South America they cling in clusters of hundreds to slender twigs, and transfer themselves to horses and cattle. They bury their heads under the skin and suck blood, becoming as large as a horse-bean. Herds of cattle are sometimes killed by the exhaustion produced by these parasites. Wet weather is fatal to them, and infested animals are often freed from them by swimming a river.

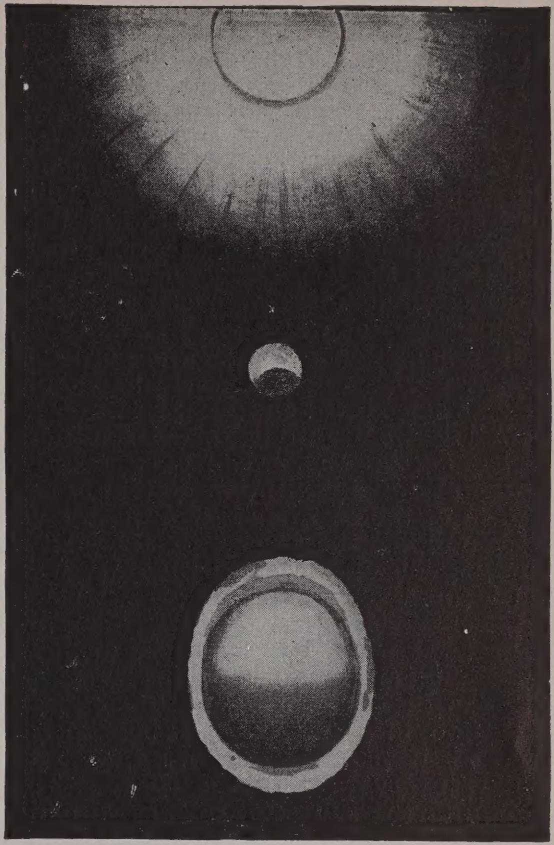
Tick'nor, George, an American author, was born at Boston, Aug. 1, 1791. He graduated at Dartmouth College when 16, and studied law. In 1820 Ticknor became professor of French and Spanish in Harvard College. His *History of Spanish Literature* was published in 1849, at once took high rank, and was translated into Spanish, German and French. His *Life of Prescott* is considered one of the finest biographies ever written. Ticknor died on Jan. 26, 1871. See *Life* by Hilliard.

Ticonderoga (*tī-kŏn-dẽr-ō′gȧ*), a village of New York at the outlet of Lake George 88 miles northeast of Albany. Population 2,475. The French in 1755 built Fort Carillon here, afterward called Fort Ticonderoga, to command Lake Champlain. Two years later Montcalm led his force of 9,000 men from this fort and captured Fort William Henry, which had been built by Sir William Johnson at the southern end of Lake George. In 1758 General Abercrombie was defeated by its garrison with a loss of 2,000 men; but next year General Amherst forced the French to dismantle and abandon it. After the battle of Lexington Ethan Allen (*q. v.*) stormed Ticonderoga on May 10, 1775. Next year Burgoyne, by planting a battery on Mount Defiance, forced the American garrison to leave Fort Ticonderoga, which the British held until Burgoyne's surrender, though it was attacked by General Lincoln. The British also held it a short time in 1780. Parts of the walls are still standing. See Joseph Cook's *History of Ticonderoga.*

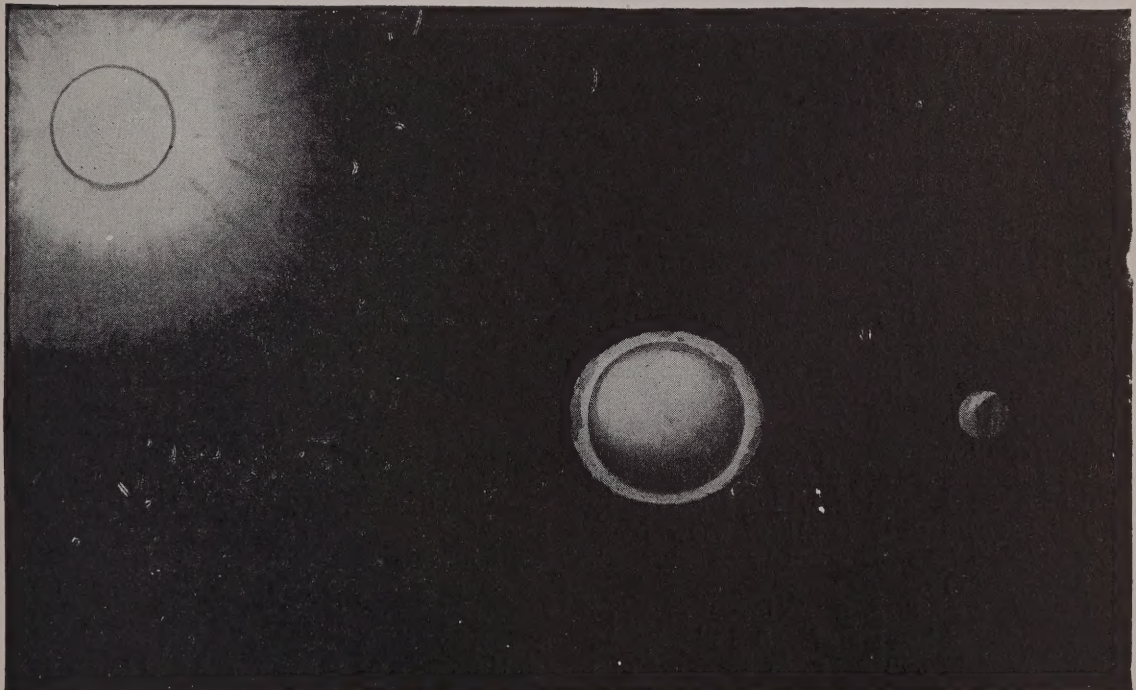
Tides, the periodic rising and falling of the waters of the sea along coasts and [illegible]s. The rising is called the *flood*, and when highest is called *high water;* the falling is called the *ebb*, and at its lowest is known as *low water.* The short lull between tides is called *slack water.* Flood-



This picture shows how the moon attracts or pulls toward itself the water on the side of the earth nearest it, causing a high tide. It also draws the earth away from the water on the other side, leaving a high tide there.



In this picture the moon and the sun being on the same side of the earth, both pulling the same way, a very high tide is caused, called spring tide.



When the moon is on one side of the earth and the sun on another, as shown here, each pulling toward itself, the attraction of the moon is weakened and the tides are not so strong. These lesser tides are called neap tides.

tide and ebb-tide each last approximately six hours, there being two high and two low tides daily. Each day high water occurs 52 minutes later than the day before, as the average time between two high or low tides is 12 hours and 26 minutes Sir Isaac Newton first discovered the cause of the tides by applying his newly discovered law of gravitation, showing that the rising of the waters is due to the difference between the attraction of the moon and of the sun upon the earth as it revolves. As the particles of water are free to move while the particles of land are not, this attraction draws them toward the moon, forming a swell in the ocean's waters. This swell draws toward it waters from both sides, leaving on the coasts a depression, or low water. Gravitation acts on the solid mass of the earth as if this mass were concentrated at the center of the globe. So on the side of the earth opposite that of the moon the waters are less attracted than the land, being at a greater distance, and are as it were, left somewhat behind, thus forming another swell, just opposite to the one in the other hemisphere. By the rotation of the earth this system of swells and troughs travels from east to west over every part of the ocean. The attraction of the sun also causes two daily tides, but these solar tides are much smaller than the lunar tides. As the moon and sun rarely are in the same relative positions, their high tides do not usually occur at the same time. But at new moon and full moon they are in line with the earth and their attractions act together, causing especially high water, known as the *spring tides.* At the time of the first and of the third quarter of the moon, it is at right angles with the sun, and their attractions act against one another, lessening the height of the high water. These are the *neap tides.*

A complete explanation of the tides cannot be given in this place. For this the student is advised to read Sir Robert Ball's *Time and Tide* in the Romance of Science Series; articles 464–84 in Young's *General Astronomy;* Francis Darwin's *Tides*, popular lectures before Lowell Institute; and, lastly, his masterly article on *Tides* in the *Encyclopædia Britannica.*

In the references just given the tides are treated as a wave-motion, which they really are. This is the only point of view from which they can be satisfactorily considered. See WAVE-MOTION.

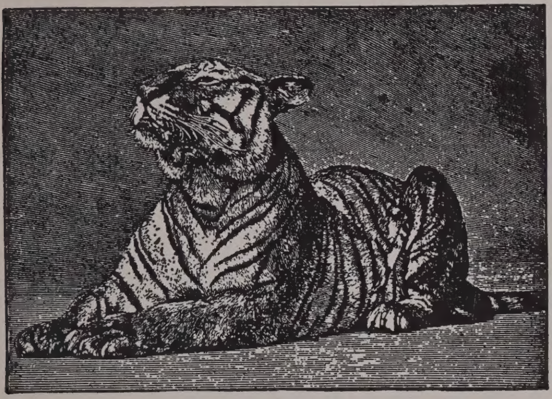
Tien-Tsin (*tē-ĕn'tsēn*), a large city of China, is on Pei-ho River, 38 miles from its mouth and 80 southeast of Pekin. The old mud and dried-brick houses have been replaced in part by well-built dwellings. The Pei-ho is generally frozen from the middle of December to the middle of March, and business, at other times carried on by means of boats and junks, is then done by sledges which swarm on the river. Tien-Tsin is an open port; it exports large quantities of cotton, peas and dates and imports cotton-goods, needles, window-glass, sugar and paper. Population 800,000.

Tierra del Fuego (*tēĕr'ra dĕl fwā'gō*), "Land of Fire," is a cluster of islands at the southern end of South America, with the Straits of Magellan between them and the mainland. They are small, mountainous islands, with many peaks over 5,000 feet high, covered with perpetual snow, while the lower slopes bear forests of beech. The island proper is Tierra del Fuego, 300 miles long. Cape Horn is the southern end of a small island of the group. The natives belong to the Patagonian race; build cone-shaped huts of branches of trees stuck in the ground with a hole for a door; dress in sealskins; and feed largely on shellfish. The climate is very variable, with storms, wind, rain and snow in close succession. The islands were discovered by Magalhaes (Magellan) in 1520, and named from the fires seen at night along the shores. They are nominally divided between the Argentine Republic (*q. v.*) and Chile (*q. v.*). See PATAGONIA.

Tif'fin, O., county-seat of Seneca County, is 34 miles by rail southwest of Sandusky, on Sandusky River. It is the seat of Heidelberg University, founded in 1850. There also are two daily and four weekly newspapers, a courthouse, three banks, sixteen churches, a convent, several schools and two libraries. It manufactures carriages, stoves, furniture, tiles, farming implements, and has potteries, glass-works, straw-board, emery-wheel and iron works, planing, flour and woolen mills and shoe-factories. Tiffin has the service of four railroads, and near the city are deposits of clay and glass sand. Population 17,000.

Tiflis (*tyē-flyēs'*), an important city of Asiatic Russia on Kur River 165 miles east of the Black Sea. It is the capital of the Russian government of the same name in Transcaucasia, and is on the military railroad which joins the Black and Caspian Seas. It has a large trade with Persia, and manufactures woolen and linen cloth, carpets and arms. It is noted for its warm-spring baths. Population 159,590.

Ti'ger, the largest and most powerful member of the cat family. The lion appears larger on account of its immense hairy head and mane, but the royal Bengal tigers reach a length of 11 feet and are able to overcome the lion in combat. They have a tawny ground-color, with black stripes on the body and limbs, the tail being ringed with black, the coloring closely resembling that of the herbage. The common tiger is about eight feet in length. It is abundant in Hindustan, does great damage to herds of cattle, and occasionally attacks man, The tiger's jaws and teeth crush the large bones of a buffalo, and it can break a horse's back with one blow of the forepaw. It is audacious, cunning, treacherous, the fiercest and most bloodthirsty of beasts. The kittens are about a foot long when born; they remain with the mother until the third year. The tigress teaches the young how to find and kill prey. They stalk their prey, and also spring upon it from ambush. A cattle-eating tiger will kill an ox about every five days or from sixty to seventy in a year. Hunting the tiger from the backs of elephants is dangerous and exciting. The range of the tiger is greater than was at first supposed. Starting with India as its chief locality, it ranges west through Persia, east through Burma to Sumatra and Java and north through China to Manchuria and even into Siberia. It is absent from Ceylon and Borneo.



TIGER

Tig'lath Pile'ser. See Assyria.

Ti'gris, a large river of Asiatic Turkey, rises south of Lake Goljik in the Kurdish Mountains, is joined at Til by the Bitlis, unites with its sister-stream, the Euphrates (*q. v.*), at Korna, and from this point to the Persian Gulf is known as the Shat-el-Arab. Its whole course is some 1,500 miles long. In its upper part it is a very swift stream. The Tigris in ancient times was the great river of Assyria, and formed the eastern border of Mesopotamia. Nineveh, Seleucia and Ctesiphon stood on its banks. Its chief cities now are Baghdad, Mosul and Diarbekir. It is navigable for steamers at all seasons below Mosul.

Til'den, Samuel Jones, was born at New Lebanon, N. Y., Feb. 9, 1814. He went to Yale College and the University of New York, and became a lawyer. As a member of New York Assembly in 1846 he was much interested in the state canals, and became one of the leading Democrats of the state. In 1874 Tilden was elected governor by 50,000 majority, and his popularity, thus shown, gave him the Democratic nomination for the presidency in 1876. The Hayes-Tilden campaign was one of the hardest-fought and closest in our history, and the disputed election was given Hayes by the electoral commission of 15 appointed by congress to canvass the votes. Tilden also was a prominent lawyer of New York City. He was one of the organizers of the bar-association, and was leading counsel in many large cases. He died near Yonkers, N. Y., Aug. 4, 1886, leaving the bulk of his fortune to found a free library for New York City. See New York Library.

Tiles. A tile is a slab of baked clay, used for covering roofs, paving floors, lining furnaces, constructing drains and for decorative purposes. The general process of manufacture involves preparing, mixing, molding and firing the clay, after which it may be polished. Fire-proof and structural tile is coming into extensive use; there are three classes: dense, porous and semiporous. The latter two are made by mixing the clay with straw, sawdust or fine coal. The porous tile can be nailed to and cut with a saw. The decorative value of tiling is seen chiefly in flooring. The body of the tile is made of one color of clay and the inlaid pattern of another. Many times figures are put on in slight relief. Tiles made in Cairo and Damascus in medieval times are of such beauty that squares of nine or sixteen are often sold for many hundreds of dollars.

Til'ley, Sir Samuel Leonard, was born in New Brunswick in 1818. He was a member of the Executive Council of New Brunswick from 1854 to 1856 and from 1857 to 1865, from 1866 until the Union holding the office of Provincial Secretary. He was frequently a delegate to England; a delegate to the Charlottetown and Quebec Conferences in 1864 and to the London Colonial Conference in 1866. He was Minister of Finance on two occasions, and was Lieutenant-Governor of New Brunswick from 1873 to 1878. He was returned to the House of Commons in 1878 and re-elected the following term. When a private member he carried the prohibitory liquor-law through the New Brunswick Assembly. He is one of the fathers of Canadian federation.

Till'man, Benjamin Ryan, was born in Edgefield County, South Carolina, on Aug. 11, 1847. He was educated at Bethany Academy, but his studies were interrupted by the Civil War. He joined the Confederate army in July of 1864, but a severe sickness cost him an eye and invalided him for two years. During the time of reconstruction (*q v.*) he was active in promoting education and became politically prominent, but followed farming as his sole pursuit until 1886. Then he was a leader of the agitation for educational, industrial and other reforms and in the opposition of the Democratic masses in South Carolina to the domination of the aristocratic elements in the party. Mr. Tillman advocated the formation of a Farmer's Alliance of Clemson Agricultural College (at Calhoun's old home) for boys and of Winthrop Industrial College for girls, each of which is the largest school of the kind in the south. In 1890 and in 1892 the Farmer's Alliance elected him governor. He instituted the dispensary system of selling liquor under state control; and was the central figure in the constitutional convention (1895), which enacted South Carolina's educational qualification for suffrage. In 1895 and 1901 he was elected to the United States senate.

Tillman, Samuel Escue, American soldier and educator, astronomer and chemist, was born near Shelbyville, Tenn., Oct. 2, 1847, and graduated at West Point, entering the army first as an artilleryman and afterward was transferred to the corps of engineers. In 1870 he was appointed assistant-professor of chemistry, and ten years later became professor of chemistry, geology and mineralogy at West Point; was assistant-astronomer of the United States expedition to Tasmania to record the transit of Venus; and has acted on several survey commissions and explorations for the United States government. He is the author of a number of textbooks in his branch of science notably a work on *Descriptive General Chemistry*, and elementary treatises on mineralogy, on the principles of chemistry and lessons in heat.

Til'ly, Johann Tserclaes, Count of, one of the greatest captains of the 17th century, was born in 1559 in Brabant. A pupil of the Jesuits and an officer under the duke of Alva, he developed into a soldier of great sternness. After fighting against the Turks, he was made commander of the Holy Roman Empire's army on the outbreak of the Thirty Years' War (*q. v.*), and with Maximilian of Bavaria gained the important battle of Prague. During the course of this war his masterly tactics separated the armies of Mansfeld and the Markgraf of Baden, beat the latter at Wimpfen, and drove Christian of Brunswick from the Palatinate, defeating him at Höcht in 1622 and again next year, in a desperate three days' battle at Stadtlohn. Now made a count of the empire, he defeated the king of Denmark at Lutter and, with Wallenstein, forced him to sign the treaty of Lübeck in 1629. Two years later he succeeded Wallenstein as commander-in-chief of the imperial troops, took Magdeburg by storm, and allowed his Croats and Walloons to pillage and massacre at pleasure. A few months later he met his match in Gustavus Adolphus, who defeated him at Breitenfeld and next spring forced him to retreat behind Lech River in Bavaria, crossing it himself in the face of Tilly's army. In this last battle Tilly was mortally wounded and died on April 30, 1632. Tilly was temperate, despised luxury and wealth, and his able support of the Roman Catholic party in the war was not due in the slightest to self-interest, but wholly to his devotion to the church.

Til'sit, The Treaty of, was a celebrated pact made by Napoleon I of France, and Alexander I of Russia in 1807. The emperors met on a raft at the center of Niemen River on June 25th; and a treaty of peace was concluded on July 7th. France and Russia made a secret agreement by which Russia was to aggrandise herself at the expense of Sweden and Turkey; and France in the west of Europe. A passive partner to the treaty was the subjugated kingdom of Prussia, which was forced to close her ports to English vessels, pay an indemnity, reduce her army to a nominal footing, and leave her fortresses as security in the hands of the French. The dominions of Friedrich Wilhelm III of Prussia were reduced one half.

Timbuktu (*tĭm-bŭk'tōō*), a city on the southern edge of the Sahara, in central Africa, some nine miles from the Niger. It is about three miles around, and formerly was surrounded by a clay-wall. Timbuktu has a large caravan-trade, gold-dust being the most important export. The people are negroes, Tuaregs, Mandingoes, Arabs and Fulahs. The city was founded in the 12th century, but was first seen by a white man in 1826. Timbuktu now belongs to France, and a railroad is proposed to connect Algiers, Timbuktu and Senegambia. It already is connected by steamer with Koulikoro. Population 12,000, greatly increased during the trading-season from November to January. See NIGERIA and SENEGAL.

Tim'by, The'odore Rug'gles, inventor of the *Monitor* (*q. v.*) was born in Dover, New York, 1822, and from childhood was an inventor. He was the first to suggest the modern use of iron in warships. In 1841 he exhibited, and in 1843 patented, a model and plans of a revolving battery to be made of iron. In 1861 he entered into an agreement with the builders of the *Monitor*, of which Ericsson (*q. v.*) was the constructing engineer, for the use of his invention. It has been mistakenly credited to Ericsson, but Timby's claim was never officially disputed. It is he who revolutionized the building of modern warships.

Time, like space, is one of the conditions under which all things are perceived. Time may be defined as *duration*, but it is doubtful whether anything is thereby added to the idea which every one already has as to the nature of time. Our notion of time as a quantity is derived from the observance of some regularly recurring event, such, for instance, as the vibration of a pendulum. In such a case we say that the "amount of time" elapsing between two events is proportional to the number of vibrations which the pendulum has made between the two events. The unit of time employed by the whole world is the *average* time which elapses between two successive transits of the sun across the meridian. This unit is called the *mean solar day*, and is divided into 86,400 parts called *seconds*, which are the units most frequently employed in measuring small intervals of time. The sun does not move through the sky at a uniform rate; but we can imagine one which does, and makes the same number of revolutions per year as the actual sun. Such a sun is called the *mean sun*. The instant at which the mean sun crosses any meridian is called *noon* for that meridian or *local noon*. Time which is measured from a local meridian is called *local time*.

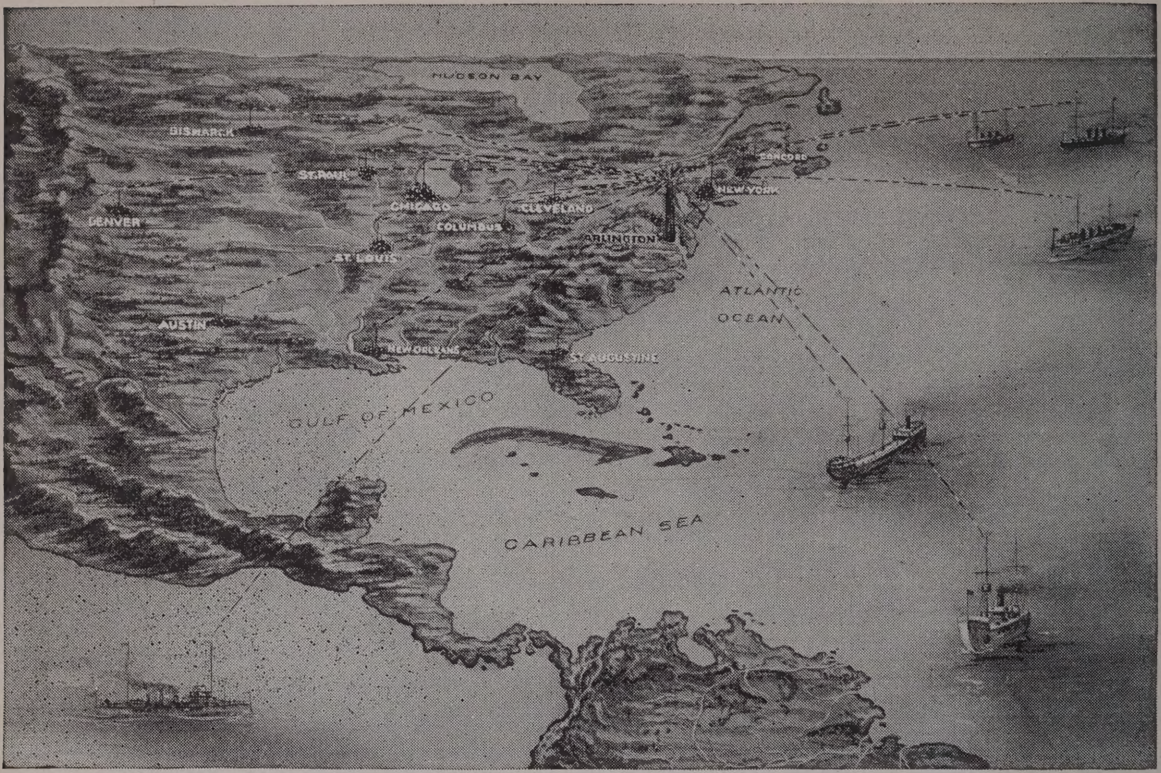
Since 1883 the United States have employed time which is counted from Greenwich noon, and is called *standard* time. Thus the inhabitants of Labrador and Nova Scotia employ time which differs from that at Greenwich by *exactly four hours;* this is called colonial time. In the extreme east of the United States, neighboring on each side of the 75th meridian, all correct watches and clocks differ exactly five hours from Greenwich time; this is called *eastern time*. In the Mississippi valley the time is six hours later than Greenwich, and is called *central time*. Fifteen degrees west we have *mountain time;* and along the Pacific coast the time is eight hours later than Greenwich and is known as *Pacific time*. *Middle European time* is one hour faster, and *Eastern European time* is two hours earlier, than Greenwich. Recently the Australian states have adopted Greenwich time — or, what amounts to the same thing, they use time which differs exactly eight, nine, ten and eleven hours from Greenwich.

Tim′othy, a disciple and companion of St. Paul. He was the son of a Greek and a Jewess, and his home either was at Derbe or at Lystra, in Lycaonia. Paul set him apart as a minister of the gospel. After preaching in Macedonia and Achaia he went at Paul's request to Ephesus, and accompanied the apostle to Jerusalem. It was to him that the two *Epistles to Timothy* were addressed by Paul. According to tradition, Timothy suffered martyrdom under Domitian.

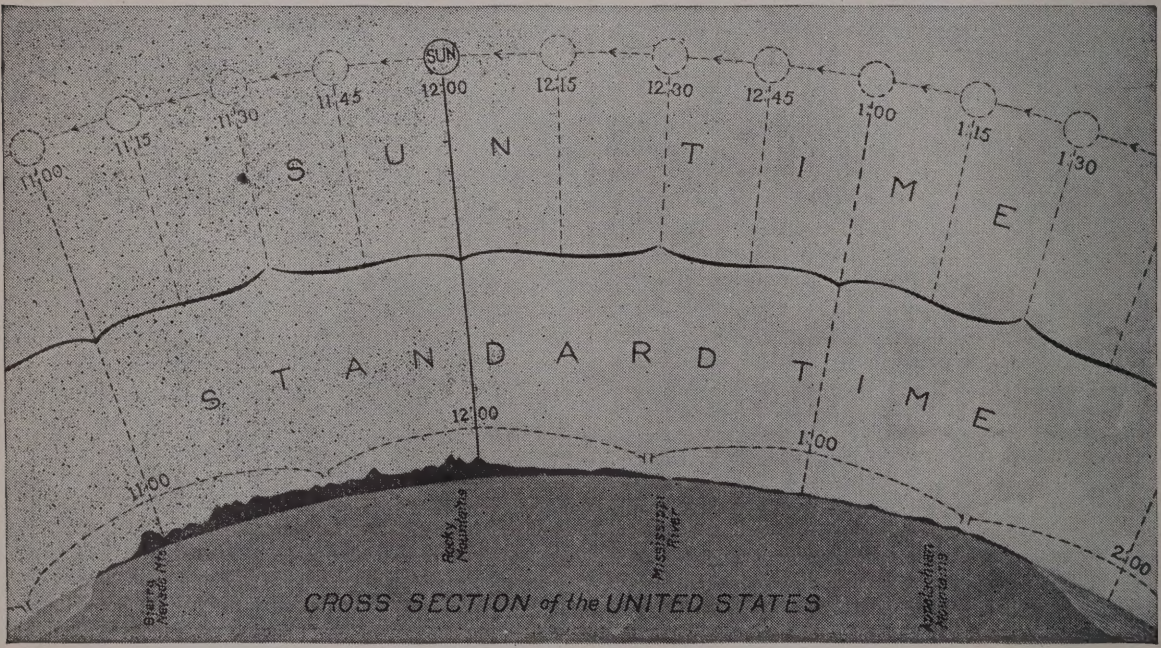
Timur (*tē-mo͞or′*) or **Tamerlane** was the second of the great conquerors whom central Asia sent forth in the middle ages, and was born at Kesh, about 40 miles southeast of Samarkand, April 9, 1333. His father was a Turkish chieftain and his mother claimed descent from the great Genghis Khan. When he became tribal chieftain, Timur helped Emir Hussein to drive out the Kalmucks. Turkestan was divided between them, but war broke out between the chiefs, and the death of Hussein in battle made Timur master of all Turkestan. He now began his career of conquest, overcoming the Getes, Khiva and Khorassan, after storming Herat. His ever-widening circle of possessions soon embraced Persia, Mesopotamia, Georgia and the Mongol state of Kiptchak. He threatened Moscow, burned Azov, captured Delhi, overran Syria, and stormed Baghdad, which had revolted. At last, July 20, 1402, Timur met Sultan Bajazet on the plains of Angora, captured him and routed his army, thus becoming master of the Turkish Empire. He took but a short rest at his capital, Samarkand, and in his eagerness to conquer China led 200,000 men across the Jaxartes on the ice, and pushed rapidly on for 300 miles, when his death. Feb. 18, 1405, saved the independence of China. In his reign of 35 years this chief of a small tribe, dependent on the Kalmucks, became the ruler of the vast territory stretching from Moscow to the Ganges. He was an able administrator, had traits of statesmanship, and patronized science and art. A number of writings said to have been written by Timur have been preserved in Persian, one of which, the *Institutions*, has been translated into English. Timur is made the hero of Marlowe's *Tamburlaine*, the first play in which blank verse appeared on the stage. The name of Tamerlane means Timur the Lame.

Tin, a silvery-white metal, with a tinge of yellowish blue and a high luster. It is softer than gold and can be rolled or beaten into very thin sheets called tinfoil. It is ductile at 212°, when it can be drawn out into wire which is not very tenacious; it melts at 455°; and volatilizes at a white heat. Air and moisture act on tin very slightly. The peculiar properties of tin, especially its malleability, its brilliancy and the slowness with which it rusts, make it very serviceable. With other metals it forms valuable alloys, as bronze, gun-metal, bell-metal, pewter and solder. Tin is very largely used in covering sheet-iron, thus forming tin-plate. Tin must have been one of the metals earliest known, as it enters into bronze of which the oldest metallic weapons and tools are made. The largest tin-mines of Europe are found in Cornwall in England, which once supplied Tyre and Sidon. There are very large tin-deposits in the island of Banka and on the Malay Peninsula, as well as in Australia. The Spanish-Portuguese and the Saxon-Bohemian mountains yield tin. Some tin is found also in Bolivia, Peru, Mexico, India and Chile. The Black Hills, South Dakota, yield about 30,000 tons annually, but we are largely dependent upon foreign sources for our supply of this metal. In 1906 the world's production was 96,196 long tons. Dioxide of tin is the only important ore; when pure it is made of 78 parts of tin and 22 of oxygen. This ore is gray, yellow, red and black and strikes fire

UNCLE SAM AND HIS STANDARD TIME

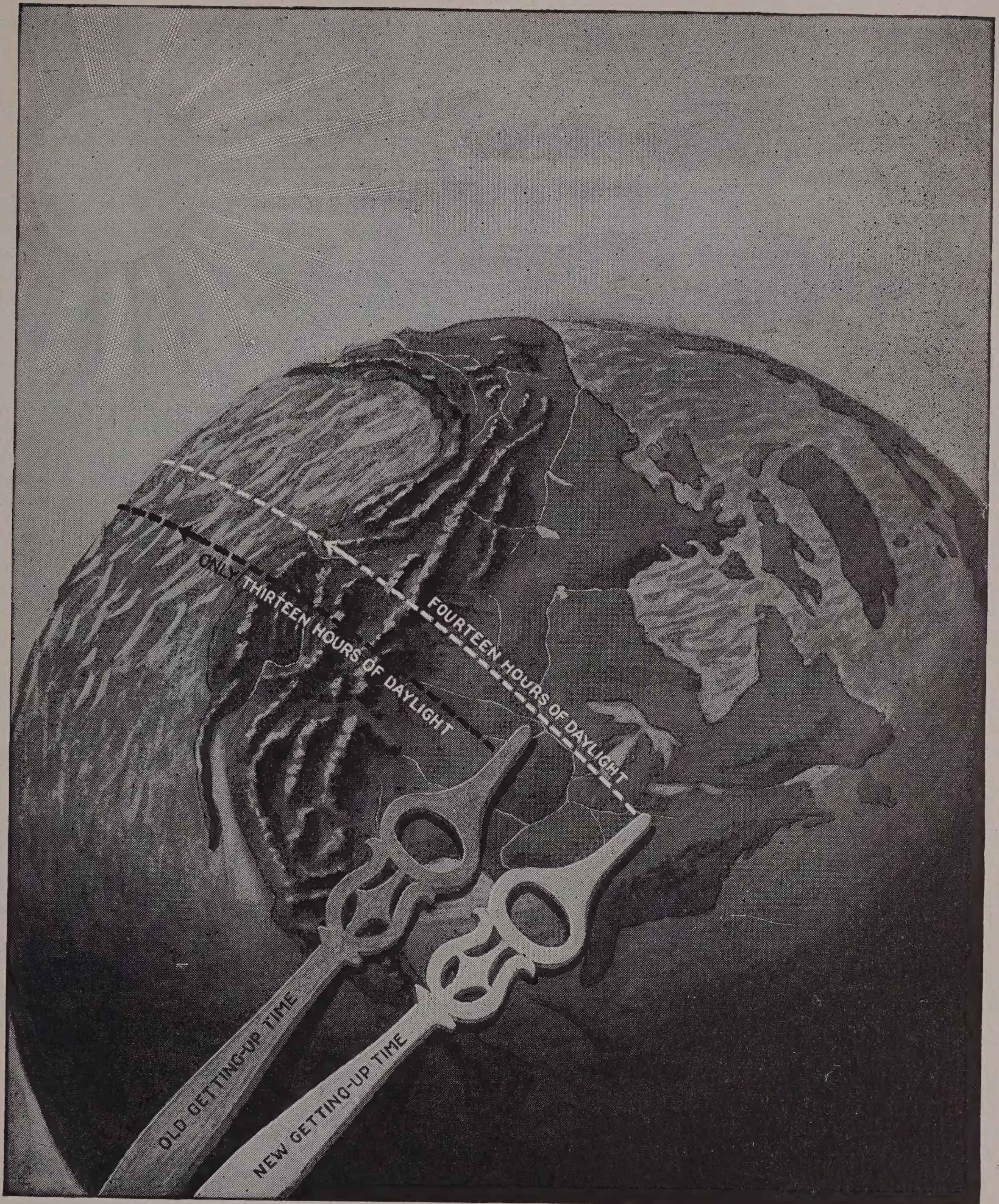

HUDSON BAY
BISMARCK
ST. PAUL
DENVER
CHICAGO
CLEVELAND
COLUMBUS
ARLINGTON
CONCORD
NEW YORK
ST. LOUIS
AUSTIN
NEW ORLEANS
ST. AUGUSTINE
ATLANTIC OCEAN
GULF OF MEXICO
CARIBBEAN SEA

This picture shows how the Government helps people keep their clocks and watches uniform all over our country and on the ships at sea. The official clocks at Washington are regulated from observations taken every clear night, of the position of certain stars, and on the following day at noon the time by these clocks is sent out.


SUN
11:00
11:15
11:30
11:45
12:00
12:15
12:30
12:45
1:00
1:15
1:30
SUN TIME
STANDARD TIME
11:00
12:00
1:00
2:00
Sierra Nevada Mts.
Rocky Mountains
Mississippi River
Appalachian Mountains
CROSS SECTION of the UNITED STATES

As you see from the diagram, noon or 12 o'clock, is immediately below the Sun, according to Sun Time, but if it were left to people's individual judgments, east or west of these points as to the time of the day, there would be much confusion, which would often lead to disaster, as in the running of railroad trains. So Uncle Sam divides the country into four sections and arbitrarily fixes how far on either side of given meridians the time indicated by the Sun at those meridians shall extend. For example, the section on the West Coast takes its time from the 120th meridian; the section of the Rocky Mountain States from the 105th meridian; the Central States from the 90th meridian; the Eastern States from the 75th meridian. This is called Standard Time, and differs from Sun Time at all points east and west of these established meridians.

COINING DAYLIGHT INTO DOLLARS



Just think what it means to turn the hands of time forward for an hour across a whole continent! That is exactly what Uncle Sam did at 2 A. M. on the last Sunday in March, 1918. And presto! As if my magic, our whole great nation of 100,000,000 people changed the order of their lives. Perhaps you have found it a little hard sometimes to get up an hour earlier than usual, but just think of getting a large proportion of 100,000,000 people out of bed an hour earlier, beginning on a certain day. This is just what our Government did with its Daylight Saving Law. Without a hitch, without the slightest confusion or disturbance, the whole machinery of life and business began moving on the new schedule, and literally, "coining daylight into dollars." It had previously been found that the restriction by government order of the use of electrical display signs to certain hours amounted to a saving of 8,000 tons of coal per month, or over 400,000 tons per year. Under the Daylight Saving Law the decreased use of artificial light in homes and public places meant an annual saving in coal alone of several million tons; while the total economy, including the saving of oil used in lamps and the manufacture of gas was estimated by the President of the American Association for the Advancement of Science, at $25,000,000. The law covered the six months from March to October. Opposition of the farmers who found it impractical in connection with farm help caused its repeal in 1919.

with steel. In Cornwall tin-ore is found in veins running through granite and slate, or scattered in crystals through their mass. The dressing of the ore is a hard and delicate operation. It only yields from ten to 84 pounds of tin-oxide to a ton of material, and is so scattered through the mass that it has to be stamped to a fine powder to separate it. It is then repeatedly washed by machinery to rid it of impurities, is passed through a furnace to separate the sulphur and arsenic, and is then ready for smelting.

Tin′dale, William, an English reformer, was born in Gloucestershire about 1490. He studied at Oxford and Cambridge, and in 1523 began his translation of the New Testament in London; but his sympathy with the Reformation becoming known by his bold speech, he had to flee, going to Hamburg for a year. The first ten sheets of his New Testament were printed at Cologne, and in 1525 at Worms two editions were published without his name. This was the first English printed copy of the New Testament. There was a great demand for it, in spite of the prohibition of the clergy and the abuse of such men as Sir Thomas More, (*q. v.*), who wrote against Tindale. The fifth edition was published in 1529, and in 1534 a revised edition came out with Tindale's acknowledgment of his work. He also brought out a translation of the Pentateuch, or first five books of the Bible, and wrote *The Obedience of a Christian Man.* Various plots had been made to arrest him, after the first issue of his Testament, and at last officials of the Holy Empire succeeded in having him taken at Antwerp, where he was imprisoned for 18 months and then executed, by strangling and burning, at Vilvorde, near Brussels, Oct. 6, 1536. In November, 1866, a memorial to him was erected at his birthplace in Gloucestershire. The King James' version (1611) of the Bible is based on the translations by Tindale. See *Life* by Demaus.

Tintoretto, Il (*ĕl tĕn-tō-rĕt′tō*), a great Venetian historical painter, was born in 1512. His real name was Jacopo Robusti, but he was called Tintoretto from the Venetian word meaning dyer, which was his father's trade. He was self-taught, except for a few lessons from Titian. He took as his motto: "The design of Michael Angelo and the coloring of Titian." He sketched so fast that he was called The Madman. Among his famous pictures are *Belshazzar's Feast*, a fresco, *The Last Supper*, *The Last Judgment*, *The Slaughter of the Innocents* and *Paradise.* He died at the age of 82.

Tippecanoe (*tĭp′pē-kȧ-nōō′*), **Battle of,** an engagement fought on Nov. 7, 1811, on Tippecanoe River in what then was Indiana Territory, over which Wm. Henry Harrison was governor, between disaffected Indians and some 800 militiamen and U. S. troops under Harrison. The cause of the native rising, which was incited by an Indian chief named Tecumseh (*q. v.*) and his brother, "the Prophet," was resentment over the seizure and sale of lands in Indiana Territory, which, the Indians claimed, were inalienably their own. Alarmed at the Indian attitude of menace, Harrison marched to and encamped near the Indian town of Tippecanoe. While there his command was attacked at night by a large force of Indians, who however, were beaten off with heavy loss. Harrison's losses were about 185; but his victory made him so popular that many years afterwards in the presidential campaign of 1840, when Harrison and Van Buren were candidates for the presidency, the war cry of the Whigs was "Tippecanoe and Tyler too!' Tecumseh, though not personally present in the battle, lost his influence in the Territory, and later fled to Canada, where he lost his life in the battle of Moraviantown during the War of 1812.

Tippecanoe, a river of Indiana, which rises in Lake Tippecanoe in the northern part of the state, flows southwest 200 miles, and falls into the Wabash, nine miles above Lafayette. On its banks was fought the battle of Nov. 7, 1811.

Tippoo Sahib (*tĭp-pōō′ sä′hēb*), sultan of Mysore and son of Hyder Ali, was born in 1749. He was brought up a Mohammedan, excelled as an athlete, and learned military tactics from the French officers in his father's service. He proved his prowess by routing the British at Perimbakum in 1780 and on Kolerun River in Tanjore in 1782. After being crowned he returned at once to the head of the army and captured Bednor in 1783. In his second war with the English (1790-92) he wasted the Carnatic almost to the gates of Madras, but was at last forced to give up part of his dominions and make peace. The English again attacked Tippoo in 1799, and while bravely defending his capital, Seringapatam, he was killed (May 4, 1799). Tippoo was very popular among his people, who looked upon him as a martyr to the Mohammedan cause.

Tirlemont (*tēr′l-môn′*), a city in Brabant Province, Belgium, 30 miles east of Brussels. Population 17,850. Here the French general Dumouriez routed the Austrians on March 16, 1793, thus winning a most important battle.

Tiryns (*tī′rĭnz*), one of the very oldest cities of Greece, was in Argolis in the Peloponnesus. According to the account handed down, it was founded by Prœtus, a king of Argolis, and its walls were built by the Cyclopes. Here Hercules passed his boyhood. Probably about 468 B. C. the city was destroyed by the Argives. The ruins are one of the finest specimens of what is called cyclopean architecture, and with those of the neighboring city of Mycenæ (*q. v.*) are the grandest of all in Greece. The walls were over 20 feet thick, formed of unknown stones of enormous size.

Tissot (*tē sō'*), **James Joseph Jacques,** an eminent French *genre* painter, famous for his series of 365 pictures representing the life of Christ, was born at Nantes, Oct. 15, 1836. He was educated at *Ecole des Beaux Arts* in Paris. In 1861 he painted his *Rencontre de Faust et Marguerite,* now in the Luxembourg. The originals are in Brooklyn's Institute of Art. He died on Aug. 9, 1902.

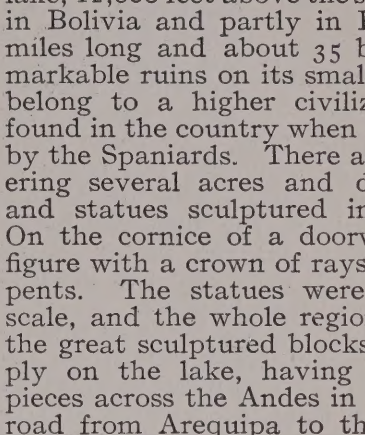
Titanic Disaster. The greatest tragedy in the history of steam navigation occurred shortly before midnight April 14, 1912, in the Atlantic, lat. 41° 46″ N. long, 50° 14″ W., the vessel striking the under-water shelf of an iceberg which had come down on the Labrador current and sinking at 2:20 A.M., April 15. Her wireless call for help was responded to by the Cunard liner *Carpathia.* Of the 2,300 passengers only 705 were saved. The death list included authors, artists, capitalists and other prominent men, who gave up their places in the boats to the women and children, many of whom were passengers in the steerage. The property loss, including the value of the ship, money and other personal property, was $15,000,000. The disaster resulted in important changes in shipbuilding and management. (See SHIPS.)

Titans (*tī'tanz*), **The,** in Greek story, were the sons of Uranus (Heaven) and Gæa (Earth). Urged by their mother, the Titans, headed by Kronos, rose against their father, dethroned him, and set free from Tartarus their brothers the Hekatoncheires (hundred-handed) and the Cyclopes. Kronos made himself king, and for fear he should be dethroned by one of his children as it was foretold he would be, he swallowed each as soon as it was born. The only son to escape was Zeus, who was saved by his mother causing Kronos to swallow a stone wrapped in a cloth, believing it to be his child. Zeus at the end of a ten years' war conquered the Titans and hurled them into a dungeon below Tartarus, surrounded by a brazen wall and guarded by the hundred-handed.

Titian (*tĭsh'an*) or **Tiziano, Vecelli,** one of the greatest of painters, was born at Capo del Cadore, Italy, in the Alps of Friuli, in 1477. His father sent him to Venice to study painting when he was ten. He was very quick at reproducing the special features of any artist's work, and sometimes beat his masters. The completion for the Venetian senate of a picture begun by Bellini, who was one of his teachers, gained him fame and an office worth 300 crowns a year. He became acquainted with the duke of Ferrara and Ariosto, the poet, whose portraits he painted, and on his return to Venice painted one of his grandest pictures, the *Assumption of the Virgin.* Pope Leo X and Raphael invited him to Rome, and Francis I to France. He painted the portrait of Charles V, and spent three years in Spain. There is no complete catalogue of Titian's works, but over 600 of his pictures are known. Far beyond his power as a designer and beyond his gifts of imagination are the splendor, boldness and truth of his coloring. He died at Venice in 1576. See his *Life* by Northcote.

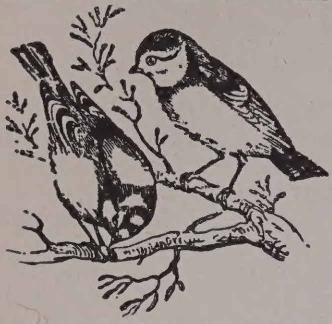
Titicaca (*tĭt'ē-kä'kȧ*), a South American lake, 12,000 feet above the sea. It lies partly in Bolivia and partly in Peru, and is 100 miles long and about 35 broad. Some remarkable ruins on its small islands seem to belong to a higher civilization than was found in the country when it was conquered by the Spaniards. There are pyramids covering several acres and doorways, pillars and statues sculptured in peculiar style. On the cornice of a doorway is a human figure with a crown of rays and crested serpents. The statues were all on a large scale, and the whole region is strewn with the great sculptured blocks. Two steamers ply on the lake, having been carried in pieces across the Andes in 1871, and a railroad from Arequipa to the lake has been built, which opens the country, with its rich stores of silver, copper and timber and its products of chocolate, coffee and alpaca-wool. See ANDES, ARGENTINA, BOLIVIA, CHILE and PERU.

Tit'lark, a class of small birds, coming between the larks and the wagtails. They live in all parts of the world, building their nests of dry grass, lined with hair, on the ground. The American titlark is a little over six inches long, olive-brown, shading to a yellowish-brown and white, with black bill and feet. In the fields or prairies it often is found in flocks of tens or hundreds running on the ground. The Missouri titlark is the American bird which is most like the skylark of Europe.



TITLARK

Tit'mouse, the common name of a number of small birds related to the warblers. There are about 75 species, found chiefly in the Old World. Four species inhabit the eastern United States. The commonest of these is the well-known black-capped chickadee, which is a winter as well as a summer resident in the southern part of its range. This bird is about five inches long, gray above and white below washed with brown. The crown and throat are black and the cheeks white. Its familiar call is *chickadee*, and besides this it has a high, sweet whistle of two or more notes. It ranges from Labrador to Indiana and Virginia. In the south it is replaced by a smaller southern chickadee. The tufted titmouse is the largest of the American species, being about six and one fourth inches long. All these birds of America are dull-colored, but some of the true Tits of the Old World are among the brightest birds of the northern hemisphere. For example, the azure tit of Siberia is white and sky-blue; the blue tit of Europe blue, white and yellow.


BLUE TITMOUSE, MALE AND FEMALE

Ti′tus, mentioned in the Bible as a companion of Paul, was a Greek sent from Antioch to Jerusalem to confer with the apostles. He traveled with Paul, going with him to Jerusalem, was sent by him to Corinth, and left at Crete, where, according to tradition, he was made its first bishop.

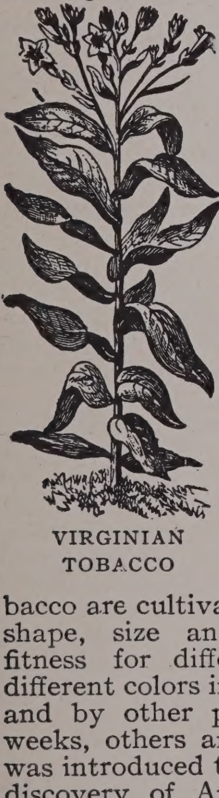
Ti′tus, Fla′vius Sabi′nus Vespa′sianus, an emperor of Rome, was the oldest son of Vespasian, and was born at Rome on Dec. 30 of A. D. 40. Brought up at the court of Nero, he became well-trained in manly exercises and a good scholar. He saw service as military tribune in Germany and Britain and as commander of a legion in Judæa under his father. When Vespasian became emperor, Titus was left to carry on the Jewish war, which he brought to a close by the capture of Jerusalem in 70 A. D. after a long siege. On his triumphal return to Rome he was received with joy by the citizens, and made a fellow-ruler of the empire by his father. On becoming sole emperor, at his father's death in 79, he at once put a stop to prosecutions for acts of disrespect to the emperor; had informers scourged and banished or sold as slaves: completed the Colosseum and the Baths of Titus; and delighted the people with public games which lasted 100 days. In 79, when the great eruption of Vesuvius took place, which buried Herculaneum and Pompeii; in 80, when a three days' fire laid Rome waste; and during the plague that followed it he despoiled his palaces to aid the sufferers. In this way Titus became one of the most popular of Roman emperors, but in the third year of his reign he suddenly died on Sept. 13 of 81 A. D.. See Colosseum, Roman Empire and Vespasian.

Ti′tusville, Pa., city in Crawford County 50 miles southeast from Erie. In the vicinity are extensive oil-fields. The first oil-well in the world of which there is any record was struck here in August, 1859. The manufactures consist of oil-refineries, paraffine-works, iron and steel works, machine-shops, foundries, radiator, forge and cutlery works, furniture-factories, sash, blind and chair works, carriage and wagon works, a silk-mill, two large chemical-works and wood-specialty work. The city has a full public-school course, from kindergarten through the high school, parochial kindergarten and elementary schools and Saint Joseph's Academy. Benson Memorial Library and Titusville Hospital are noteworthy institutions, and the city has several churches. Water is supplied from artesian wells, and the city has all the adjuncts of a progressive place. Oil Creek, swollen by heavy rains in 1892, flooded the lower part of the city, causing several oil-tanks to give way. The oil spread on the water, became ignited, and caused damage to property and some loss of life. Titusville has the service of two railroads. Population 8,533.

Tivoli (*tĭv′ō-lĭ* or *tē′vō-lē*), a city of Italy, 18 miles east of Rome, stands on the slope of Monte Ripoli, one of the Apennines. It is a walled town, with a fortress, steep, narrow streets and a cathedral, once a temple of Hercules where Augustus held court. Since the time of Pliny its vineyards have been noted for their fine-flavored grapes, and the *travertino* stone, of which a great part of Rome is built, comes from Tivoli. Near the city are the temple of Vesta, built in 76 B. C., the remains of the villas of Hadrian and Mæcenas and the ruins of early Roman mausoleums, baths and aqueducts. Tivoli was in Roman times called Tibur, is mentioned in 446 B. C., and is said to be older than Rome. It is one of the few towns of Latium still on their old sites. It also was a noted suburb of Rome, Scipio, Marius, Horace and many other prominent Romans having Tiburtine villas. Population 12,880.

Toad, an amphibian animal related to the frog, having a similar structure and life-story. The skin is covered with warts, but the milky secretion is harmless. Toads are more terrestrial than frogs; after they become mature they return to water only to lay eggs, while frogs always remain near the water. Their eggs can be distinguished from those of frogs from being laid in long strings instead of masses of gelatinous substance. The toad is often used for making nature-observations in schools, and is an excellent subject for study. Hodge in *Nature-Study and Life* says: "No aquatic egg is better adapted for such use [study in school-room]. It is large enough to be seen with the unaided eye, develops under all sorts of conditions, and the progress is so rapid that interest is sustained to the end. First the egg elongates, then the tiny, flat tadpoles hatch and, feeding first on the gelatinous matter of their envelope, soon begin to eat the slime in the aquarium and grow with great rapidity; hind legs appear, fore legs come, the tail is absorbed, and the little toads emerge from the water — all within little more than a month from the time the eggs are laid." The aquarium should have about two inches of moist earth in the bottom and the toads should be fed with a wide variety of insects or bits of fresh meat. The toad is a good friend to man in that it destroys such numbers of insects. Hence it is valuable in the garden. Toads seek moist, shady places and may be found under boards, stones and leaves. The toad has too long been looked upon with superstition and aversion, grown people as well as children agreeing in putting out of the way all toads come upon; in reality, they are harmless, of great benefit to man, and should be protected. The song of the toad, the piping of the male in the spring, is a pleasant sound, called by Hamilton Gibson a "drowsy drool that brings your feet to loitering in the deepening dusk." Consult Kirkland's *Habits, Food and Economic Value of the American Toad.*

Toad'stool. See BASIDIOMYCETES.



VIRGINIAN TOBACCO

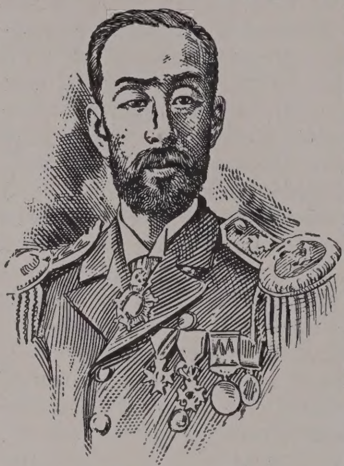
Tobac'co, species of *Nicotiana*, a genus of the nightshade family. *N. tabacum* is the best-known species, but *N. rustica* is also much cultivated. The *latakia* of Syria and the commonly cultivated tobaccos of Cuba, the Philippines and the United States belong to *N. tabacum.* Turkish and Hungarian tobacco belong to *N rustica.* Common tobacco (*N. tabacum*), grows from two to eight feet high. Its leaves are lanceolate, oblong or ovate in shape, from 12 to 42 inches long and eight to 24 wide. They are in turn so attached to the stem that the first is below the ninth and the second under the tenth. A hundred varieties of common tobacco are cultivated, distinguished by color, shape, size and texture of leaves; by fitness for different soils and uses; by different colors in the plants during growth; and by other points. Some ripen in six weeks, others are slow to ripen. Tobacco was introduced to the civilized world by the discovery of America, where the natives were found using it. The valuable properties are found in the leaves, which are dried and cured. More tobacco is produced in the United States than in any other country, but it supplies less than half the tobacco of commerce. Five leading types are grown in this country. Seed-leaf tobacco includes all tobacco for cigars, and is raised in the Connecticut and Housatonic valleys, Florida, Miami Valley, northern Illinois, some counties of central New York, southern Wisconsin and the Susquehanna valley of Pennsylvania. White Burley tobacco is mainly used for making plug and fine-cut chewing tobacco and the lower grades of pipe-tobacco. There also are heavy or dark tobacco and yellow tobacco, Danville, Va., being the greatest market in the world for the latter. This is used for plug, wrappers, high-grade pipe-tobacco and granulated tobacco in cigarets. American perique is grown only in Louisiana. Tobacco demands a strong and heavily manured soil. The soil's color influences that of tobacco, and its elements the quality of the cured product. Tobacco is cultivated much like cabbage. It is cured, that is, has the sap dried out, by airing it or by heating it. It then is prepared for market by sorting it into grades, which number from two to ten according to the variety of the plant; packed and pressed in boxes; and then fermented or sweated in the warehouse. The annual product of the United States is 984,000,000 pounds from 200,000 acres, and on the farm it is valued at $91,458,773. The annual product of other countries, according to the latest statistics, is as follows: Russia, 176,953,000 lbs.; Hungary, 189,652,000; Japan, 91,854,000; Turkey, 100,000,000; Germany, 62,122,000; Brazil, 65,679,000; France, 54,610,000; Java, 49,100,000; Summatra, 46,500,000; Cuba, 59,323,000; Philippines, 40,258,000. The total product of the world annually is 2,046,000,000 pounds. The total annual value of American tobacco-products is $331,000,000. Cigars and cigarets are 64.7% of this value, chewing and smoking tobacco and snuff 35.3%. The making of cigars and cigarets is one of the few factory-industries pursued in every state and territory. New York leads, followed by Pennsylvania, Florida, Ohio and Illinois. It is grown as a commercial product in almost every state of the Union, Kentucky very far exceeding all other states in acreage under cultivation. The next states in order of production are No [illegible]a, Virginia, Ohio, Pennsylvania and Wisconsin. Outside of the United States the cultivation of tobacco is chiefly in tropical and semitropical countries. *Vuelta del Abajo*, a rich plain in Cuba, producing the finest grades.

Tobacco-Worms, familiar and very injurious larvæ, the young of sphingid moths. They are large, green caterpillars, striped on the side with white and having horns at one end of the body. A northern species, frequently called the tomato-worm, is found in the country generally wherever tobacco is extensively grown, and is the more common form in the northern tobacco belt. The life-story and habits of the two are very similar. The pupa-state is passed underground. In May and June the moths appear and deposit their eggs singly on the lower surface of the tobacco-leaves. In three days the larvæ hatch, moult five times, feed voraciously, and in about three weeks reach full growth. There usually are three broods a season, though sometimes there are four in the south and but two in the north. The first brood does not do much damage: it is the July brood the planter fears. In fighting it hand-picking has long been in use, but is expensive. Though objections are made to the use of poison spraying with Paris green is employed, beginning as soon as the new brood appears. Combatting the pest by destroying adult moths is resorted to: the flowers of the jimson weed, previously powdered by a cobalt solution sweetened with molasses, are placed around a field in the evening; the moths come to these, attracted by the smell of the molasses, and are poisoned. The worm has natural enemies, as insect parasites whose larvæ feed upon it before it transforms to the pupa. Worms covered with what appears to be a mass of small white eggs are often seen: the seeming eggs being cocoons of the parasites. These parasitized worms should not be destroyed, but as natural enemies of the pest given all encouragement.

To'cantins' River, Brazil, 1,000 miles long, from the junction of the Almas and Maranhão to the Para, into which it falls. Its branches are the Araguaya, Paraman, Great Somno, Tucahunas and Theresa. The Tocantins is eight miles wide at its mouth, and the tide ascends the river for 300 miles.

Tocqueville (*tŏk'vĭl*) **Alexis Charles Henri Clérel de,** was born at Paris, France, July 29, 1805. He studied law and became a judge at Versailles in 1826. Five years later the French government sent him to the United States to examine the penitentiary system. This mission gave him the chance to study American institutions, and resulted in his writing his masterpiece, *Democracy in America* one of the very ablest of the many books on America by foreigners. It still is of the highest authority. His other chief work was *The Ancient Régime and the Revolution*. De Tocqueville was in politics from 1839, when he was chosen deputy, till his release from a short imprisonment at the time of Napoleon III's seizure of power in 1851. For five months in 1849 he was minister of foreign affairs. He died at Cannes, April 16, 1859.

Todleben (*tôt'lâ-bĕn*), **Franz Eduard,** General, was born at Mitau in Courland, Russia, May 20, 1818 He attended the school of engineers at St. Petersburg From 1848 to 1851 he was with the Russian army in the Caucasus fighting the native leader Shamyl. In the Crimean War he became known throughout the world for his defense of Sebastopol. After strengthening the fortifications of Cronstadt and Nikolaiev, he was made chief of engineering in the war-office in 1860. He took a prominent part in the Russo-Turkish War of 1877–8. Todleben wrote a history of the defense of Sebastopol, which has been translated into English and other languages. He died near Frankfort, July 1, 1884. See SEBASTOPOL and SHAMYL.


ADMIRAL TOGO

Togo, Admiral. Heihachiro Togo was born in Satsuma, Japan, 1847 His mother was an educated woman of character and ability; his father was governor of a local province. Little is known of his early boyhood. His first teacher was Takemore Saigo who headed the Satsuma rebellion, and killed himself upon its failure. The spirit of his teaching is expressed in "Where you see faults take the blame of them yourself; where there is merit attribute it to others. Act resolutely, and the very gods and demons shall flee before you." The government sent Togo to England in 1871, where he spent a year as a cadet on the training-ship *Worcester*. Captain Smith described him as "a great plodder; very slow to learn but very sure when he had learnt." He was made sublieutenant in the Japanese navy but remained at his studies in England until 1878. He rose steadily, and early in his career became known as one of Japan's most daring naval officers He fully appreciated his country's rights upon the sea and was always ready to defend them. In 1895 he practically began the war with China by firing upon Chinese transports carrying troops with an evidently hostile purpose. The Japanese emperor, at the close of this war, conferred upon him the decoration of the Rising Sun and shortly after made him commander in chief of the standing squadron. On the outbreak of the Russo-Japanese War, 1904, he was appointed commander-in-chief of the Japanese navy, and very ably conducted the operations against Port Arthur. His official report of this action won the admiration of foreign naval officers for its simplicity, directness and modesty. The admiral's greatest victory was in the Battle of the Sea of Japan. He had personally supervised the training of the sailors whose superior marksmanship, at long range on rough water, wrought such terrible destruction in the enemy's fleet. On May 27, 1905, Togo found his position across the path of the Russian fleet, east of the Tsu Islands in the Eastern Channels, and signaled: "The destiny of our empire depends on this action. You are all expected to do your utmost." The entire Russian fleet was sunk, excepting three destroyers and one cruiser. Togo bears his honors modestly. He lives with his wife and children in an unpretentious house in Tokio, devoting his leisure to hunting, fishing and flower-culture.

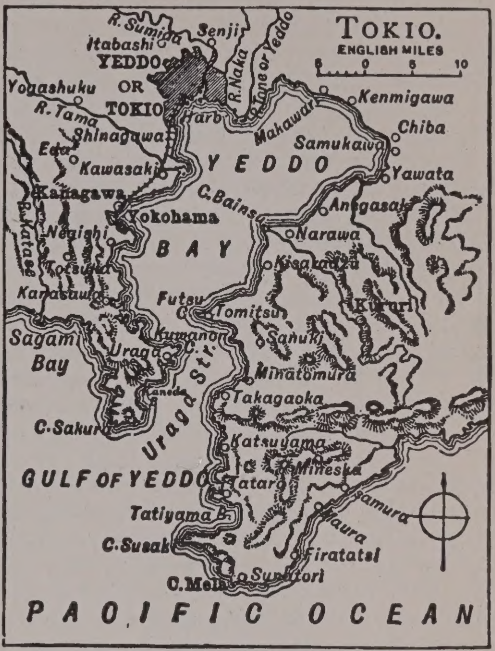
Togoland (*tō'gō-land'*) an African possession between the Gold Coast on the west and Dahomé on the east, with an estimated area of 33,630 square miles and a population of 917,227 Sudanese, Negroes and a few Europeans. There are only 32 miles of coast, but the territory widens inland between Volta and Mona Rivers to four times that breadth. The colony extends 335 miles inland. Lome is the chief port and seat of the imperial governor, and Little Popo, Porto Seguro and Bagida are other seaports. The colony is self-supporting. Commerce is increasing rapidly. The imports are chiefly cotton, spirits, tobacco, wood and iron; the exports palm-nuts and oil and rubber. There are two government-schools with 200 pupils and 141 mission-schools with 5,200 scholars. The natural resources are considerable, and the development of the country by white men is going on rapidly. Good roads connect many of the principal points, many more are under construction, and a railway is building between Lome and Little Popo. The chief post-offices at Lome, Little Popo and Agome Palime, are connected by telegraph and telephone with one another, and with the Gold Coast and Dahomé.

There is a railway between Lome and Little Popo.

Tokat (*tō-kät'*), a city of Asiatic Turkey, 60 miles south of the Black Sea. It is shut in by mountains on three sides, and suffers furnace-heat in summer. There are large gardens and vineyards, copper is smelted, and cotton is manufactured. There is only a small trade, though Tokat once was an important business center. Population about 30,000.

Tokay (*tō-kā'*), a wine made from vines growing in the neighborhood of the town of Tokay, Hungary. The Tokay wine-district covers about 15,000 acres. Great care is taken in assorting the grapes and in preparing the wine, which is brownish yellow while new, changing to a greenish hue as it ages. The yearly yield is about 1,550,000 gallons. The wine-gathering is celebrated by a national festival. Population of the town about 5,100.

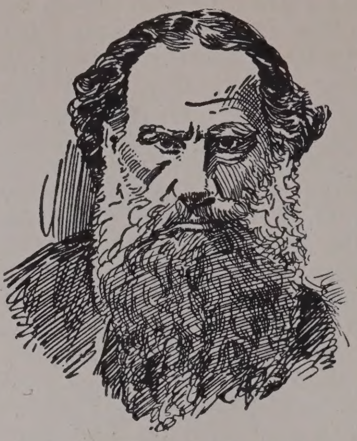
Tokio or **Tokyo** (*tō'kē-ō*), meaning Eastern Capital, formerly called Yeddo, is the capital of Japan, and stands in the eastern part of Honshiu, the main island, at the head of Yeddo Bay. The city covers nearly 60 square miles, and is divided into thickly built and inhabited districts, separated by large gardens and groves and cut by canals and moats. In the center is the fortress guarded by stone-walls and a moat, beyond which another wall shuts in about three square miles, while a third wall incloses about five square miles. Wide, clean streets lighted by gas; brick and stone buildings; and western merchandise in the stores give Tokio the look of a European city. Shinto shrines and Buddhist temples stand in the cemeteries, and there are four Christian churches. The Imperial University of Tokio, supported by the government, has 260 teachers, exclusive of 16 foreigners, and 4,425 students. There are banks, newspapers, steam-factories, carriages, theaters, telegraph connection with other cities and railroads to Yokohama and Saikyo. Iyeyasu, the famous general and statesman, fixed his seat of government at Yeddo, the "port," in 1600, and here his descendants reigned until 1868, when, as a result of the revolution against the *shogun*, the mikado established his court here and changed the name of the city to Tokio. The city has suffered greatly by fires, and by earthquake shocks in 1656 and 1854. Yeddo was thrown open to settlement by foreigners as the result of the treaty made by Commodore Perry between the United States and the *shogun* in 1854. Population 2,186,079. See JAPAN.


TOKIO.
ENGLISH MILES
5 0 5 10
R. Sumida
Senji
Itabashi
YEDDO
OR
TOKIO
R. Naka
R. Tone or Yeddo
Yogashuku
R. Tama
Harb
Shinagawa
Mahawari
Kenmigawa
Chiba
Samukawa
Eda
Kawasaki
YEDDO
Yawata
Kanagawa
C. Bains
Yokohama
Angasaki
Narawa
Negishi
R. Katae
BAY
Kisakadzu
Totsuka
Kanasawa
Futsu
Kururi
Tomitsu
Sagami Bay
Kumano C.
Sanuki
Uraga
Minatomura
Uraga Str.
Kaneda
Takagaoka
C. Sakura
Katsuyama
Mineska
GULF OF YEDDO
Hataro
Amura
Tatiyama B.
Haura
C. Susaki
Firatatsi
C. Mela
Sunatori
PAOIFIC OCEAN

Tole'do, a famous Spanish city, formerly the capital of the country, stands on the Tagus, which surrounds it on three sides, 55 miles southwest of Madrid. It is built on hills 2,400 feet above the sea. The Tagus is its fortress, rushing around it between high and rocky banks and leaving only one approach on the land-side, which is defended by an inner wall built by Wamba, the Gothic king, in the 7th century and by an outer wall built by Alfonso VI in 1109, both remarkable for the number and beauty of their towers and gates. In the middle of the city rises the high cathedral, surrounded by many churches and convents. This superb cathedral. built in 1492 on the site of a Moorish mosque, though plundered in 1521 and 1808, is remarkable still for its stained glass, sculptured choir and gilded metal pulpits. The famous Toledo blades known in the time of Livy, who wrote about them, were so perfectly tempered that they were sometimes curled up like watch springs and packed in boxes. The Moors captured Toledo in 714; it became a part of Castile in 1085. In the heyday of its career it is said to have sheltered 200,000 people. Toledo also is a province, with an area of 5,919 square miles and a population of 376.814. Population of city 23,317.

Toledo, O., was organized in 1833 by the union of the villages of Port Lawrence and Manhattan. It is on both sides of Maumee River, near its mouth, and covers nearly 30 square miles. There are points in and about Toledo of historic interest. Anthony Wayne, Wm. H. Harrison, Commodore Perry, General Proctor and the Indian chiefs Pontiac, Little Turtle and Tecumseh made Toledo and the Maumee valley of interest to students of history. By 1910 there were only 29 cities in the United States with a larger population. Toledo ranks third in population in Ohio, and is destined to become a great commercial center. It is at the southwestern extremity of Lake Erie, and is, therefore, the natural lake-port for the trade and commerce of the Ohio and Mississippi region, including the greatest corn-growing belt in the world, the oil and coal fields of Ohio and Indiana, the salt, lumber and iron of Michigan. The Ford Plate-Glass works, the Libby Glass factory, the National Malleable Castings Company, the oil-refineries, the automobile factory of the American Bicycle Company and the Craig Ship-yards are some of Toledo's leading industries. There are about 40 million dollars invested in the city's manufactures, which have an annual yield of about $45,000,000.

Toledo is a city of beautiful homes. It has a fine system of parks and boulevards; its street-car system, 26 railroads and steamboat and electric lines give rapid transit to all parts of the country. Its modern school-system is among the best in the United States. It was organized in 1898 upon the federal plan of government. The city supports a fine public library, Toledo University, two high schools, a city normal school, manual-training schools for high school and elementary departments, 40 primary and grammar schools; enrolls 22,000 pupils; and employs about 500 teachers. Population, 275,000.



COUNT LEO TOLSTOI

Tolstoi (*tŏl′stoi*), Count **Leo** (or **Lyof**) **Nikolaivitch,** an eminent Russian novelist and social reformer, was born at Yasnaia Poliana in the government of Tula on Aug. 28, 1828, and was educated at the University of Kasan (Russia in Europe). Early in life he was a soldier, and served in the army in the Caucasus and in the Crimea, where he was present at the battle of the Tchernaya and at the storming of Sebastopol by the allied forces. This experience enabled him to write with such graphic force not only his narrative on *Sebastopol*, but his tale of Napoleon's invasion of Russia, entitled *War and Peace*. *Anna Karénina*, a tale of guilty passion, placed him among the masters of fiction. This was followed by a number of works which have earned for him the title of the Prophet of Renunciation, and led him to lead the life of an anchorite, toiling on his land with his own hands, sharing his crust with the humblest, in rigid obedience to Christian precept. He was an uncompromising opponent of coercive government and a bitter arraigner of modern society. His other writings embrace *My Religion*, *Resurrection*, the *Kreutzer Sonata*, *Master and Man*, *My Life*, *My Confession*, *Patriotism and Christianity*, *The Christian Teaching*, *The Kingdom of God Within*, *The Four Gospels Harmonized and Translated*, *What is Religion* and *The End of the Age*. See Ward's *Gospel of Count Tolstoi in Prophets of the Nineteenth Century*. Died Nov. 20, 1910.

Tol′tecs. See MEXICO.

Toma′to, a favorite vegetable or fruit (popularly called love-apple) which ranks perhaps next to the potato in the extent of its consumption. It is a native of the warmer regions of the American continent and is raised largely as a canned vegetable for table-use. It is grown best in a sandy, well-fertilized soil; and may be grown from seed or from cuttings. If from seed, the tomato should be raised under glass and later transplanted to field or garden, care being taken to guard the plant from frosts. The plants while maturing should be supported on stakes or wire-trellis to keep the fruit from the ground and remove danger from rotting.

Tomato-Worm. See TOBACCO-WORM.

Tombig'bee, a river of Mississippi and Alabama, which rises in the northeastern corner of Mississippi, receives the Black Warrior and, by its junction with the Alabama, forms Mobile River about 45 miles above Mobile. It is about 450 miles long, and is navigable for large steamboats to Columbus, Miss., 366 miles from Mobile Bay.

Tomp'kins, Daniel D., an American politician who became vice-president of the United States in 1816 and in 1820, was born in what now is Scarsdale, in Westchester County, N. Y., on June 21, 1774. He studied at Columbia College, and, after graduating, was in 1797 admitted to the bar. In 1805–7 he was a justice of the supreme court of the state. after which he became governor for about ten years 1806–17). In 1812 he somewhat arbitrarily prorogued the legislature to prevent the charter of the Bank of America, with a capital of $6,000,000, alleging bribery. He took an active part in the War of 1812, recruiting and equipping well-nigh 40,000 of the state's militia and aiding the state with money raised by his own security. As governor one of his last acts was to recommend the abolition of slavery in the state. He died on Staten Island, N. Y., on June 11, 1825.

Ton'awan'da, N. Y., a city in Erie County, on Niagara River and Barge Canal and on N. Y. Cent. and Hudson River, Erie and Lehigh railroads, ten miles north of Buffalo. Adjoining North Tonawanda, with which it is connected by a bridge over Tonawanda Creek, it also has connection with Buffalo by two electric tramways. It has a fine park, an armory, public library and high school. Its industries, which utilize Niagara River for water-power, include lumber-manufacturing, a paper-mill, iron-works and ship-yards. Settled about 1820, the town became a city in 1904. Population 12,000.

Tongue (*tŭng*), a muscular organ, reaching from the hyoid or tongue bone, backward and downward and in front to the teeth. The upper surface, borders and front third of the lower surface are free; while the remaining parts are fixed to neighboring parts by the covering of mucous membrane. At certain points this membrane, on leaving the tongue, forms folds containing fibers, which act as ligaments to the tongue. The largest of these folds is called the *frenum* or bridle of the tongue, and joins its free front end to the lower jaw. This bridle limits the backward movement of the tip of the tongue. In rare cases it reaches to the tip, so as to interfere with speech and chewing, and the child is said to be tongue-tied. The upper surface is divided into two parts by a middle, lengthwise furrow. (For the little hills on the top of the tongue see Taste). At the back of the surface are mucous glands, reaching into long canals and helping to secrete the fluid that moistens the tongue. The furrow on the under surface is deeper, with veins running forward on each side of it. The base of the tongue becomes wider before being fixed in the tongue-bone, which, with the ligaments, is the tongue's framework. There are two sets of muscles, the extrinsic or outside muscles, which fasten the tongue to certain points and move it on them; and intrinsic or inside muscles, which pass from one part of the tongue to another, make up its chief bulk and move it on itself. By the action of the various muscles the whole tongue may be drawn back; its upper surface be hollowed or bowed or pressed against the roof of the mouth; its tip may be thrust straight out or sideways, upward and downward or into a hollow tooth where food might lodge. See Taste.

Ton'ka Bean. See Vanilla.

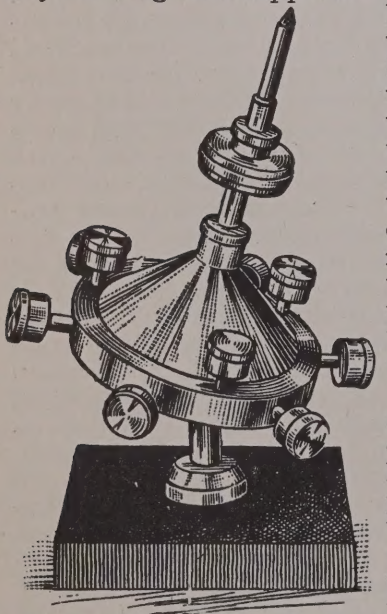
Ton'quin or **Ton'kin,** a dependency or protectorate of France in French Indo-China, acquired in 1884. Its area is 46,000 square miles, with an estimated population of close upon 10,000,000. It is south of China proper with Burma on the west, Siam and Anam on the south and the Gulf of Tonquin on the east, enclosed from the south China Sea by the island of Hainan. It is traversed by Song-Koi or Red River, on which is Hanoi, the capital and largest city, the seat of the resident superior of the protectorate and of the governor-general of French Indo-China. Its chief port, on the Gulf of Tonquin, is Haip-hong, which has a fine harbor and is connected by a railway, 60 miles in length, with the capital; while another line runs inland for 200 miles to Vinh. The forests of the dependency are rich in ebony, sandal-wood and iron-wood; while the vast lands of the delta yield rice, sugar-cane, mulberry, bamboo and areca-nut; the mountainous parts produce coffee, tobacco and indigo. Jute has recently been cultivated considerably; while other exports include oils, pepper, animal products, silk and rice. Among its useful animals is the buffalo. Before the French protectorate was established, the region formed a part of the Anamese kingdom, now also embraced in French Indo-China. On the coast, which is a vast marshy stretch, are coal-beds estimated to be from 300 to 400 square miles in extent. Formerly the country was infested by predatory Chinese soldiery, known as "Black Flags" and supposed to be escaped bands of the Taiping rebels. See Anam, Cambodia, Cochin-China, Laos, Shan and Siam.

Toombs, Robert, American politician, member of the Confederate Congress (1861) and Confederate secretary of state, was born in Wilkes County, Ga., July 2, 1810, and died at Washington, Ga., Dec. 15, 1885. After graduating at Union College and studying law at the University of Virginia, he was elected to Congress in 1844, and in

1850 contributed to the passing of the compromise measures. From 1853 to 1861 he was a member of the United States senate, a southern extremist and leading disunionist. In 1861 he became secretary of state in the Confederate government, but resigned to accept the commission of brigadier-general on the southern side. He was at the second battle of Bull Run, was at Antietam in 1862 and in 1864 commanded the militia of Georgia. After the war he lived abroad till 1867, denouncing strongly the reconstruction measures of Congress, and on his return to the south he refused to take the oath of allegiance to the United States government. Consult Trent: *Southern Statesmen of the Old Régime.*

Ton'ty, Henri de, an Italian explorer of great resolution and courage and a companion of La Salle, was born about the middle of the 17th century and died at Fort Louis (Mobile) in 1704. He served both in the French army and the navy, was with La Salle in Canada, effected the first settlement in what now is Illinois, and accompanied La Salle on his famous voyage down the Mississippi to its mouth. He returned for supplies; and in 1686 again descended the Mississippi in search of La Salle. He is identified with the early history of Illinois (until 1702) and of Louisiana. His memoirs were published in Paris in 1897. Consult Parkman's *Discovery of the Great West.*

Top. The ordinary spinning-top is a rapidly rotating solid supported on a single point below the center of gravity. Suspended in this way the weight of the top acting through its center of gravity exerts a moment of force which tends to tilt the top. The result is that the top "precesses," instead of falling over, thus exhibiting those phenomena so well-known to every boy of ten. For a detailed explanation of the dynamics of the top consult Worthington's *Dynamics of Rotation*, chap. xiii, or Perry's *Spinning-Tops.* Clerk-Maxwell devised a top having more or less the shape of a bell, so that the point of support could be placed at, above or below the center of gravity. It is provided also with adjusting screws as shown in the accompanying figure, so that its mass can be distributed in various ways about the axis of rotation. The chief interest attracting this particular form of top, besides the fact that it most beautifully illustrates the general principles of rotation, lies in the fact that it accurately simulates the motion of our earth on its axis, demonstrating on a small scale the phenomena of precession, nutation, variation of latitude dynamic and static instability etc. Consult Maxwell's original account in his *Scientific Papers*, Vol. I., pp. 248-68, and a detailed and popular account in *The Physical Review*, Vol. VI., March, 1898. See GYROSCOPE.



MAXWELL'S DYNAMICAL TOP

To'paz, a mineral and a gem, the finer varieties of which are much valued for their luster and the beauty of their colors. It is made up chiefly of alumina, silica and fluorine. It is usually found in very old rocks and in most parts of the world. Fine topazes are found in Ceylon, but those most prized come from Brazil. Topaz either is colorless or in many shades of red, blue, green or yellow; it is translucent or almost transparent on the edges; and it is harder than quartz. When cut or set, topazes are easily mistaken for diamonds or rubies, but they are not so hard as either of these gems.

Tope'ka, Kas., capital of the state and county-seat of Shawnee County, is built on both sides of Kansas River, 67 miles west from Kansas City and 300 from St. Louis. The surrounding country is a rich, rolling prairie. It is a large milling-center, and has manufactures with a yearly output of $10,000,000. It also is an important railroad and distributing point, being served by the Santa Fé, Rock Island and Union Pacific main lines and a branch of the Missouri Pacific. It has electric street-railroads, broad streets and handsome churches and buildings. Among the public buildings are the capitol, United States government building and the state asylum for the insane. Besides these Topeka has two handsome buildings belonging to the Y. M. C. A., and the railroad Y. M. C. A., a splendid auditorium and 71 churches. The free public library has 10,000 volumes, the Kansas Historical Society library 40,000 volumes, and the state library 28,000 volumes. The public-school system is excellent and includes high and manual-training schools, while among its schools of higher learning are Washburn College (Cong.), founded in 1865, having 720 students; an Episcopal college for women; and a Roman Catholic seminary. Topeka was settled in 1854, and became the capital in 1861. The city owns the electric street-lighting plant and its water-works, while the Topeka Edison Company furnishes light, power and heat for commercial and domestic uses. Topeka is also supplied with natural gas, which is distributed for domestic and manufacturing uses. Population 60,000.

Top'lady, Augustus Montague, was born at Farnham, Surrey, England, Nov. 4, 1740. He went to Westminster School and Trinity College, Dublin, became a clergyman, and preached in Devonshire and in London. For a time he was editor of a religious magazine, and he published religious books. He is remembered as a hymn-writer, especially as the author of *Rock of Ages*. Toplady died at London, Aug. 11, 1778.

Torna'do. See STORM.

Toron'to, Can., capital of Ontario is on the northern shore of Lake Ontario. The harbor at its front is formed by an island lying south of it. We first hear of it as a trading-fort built by the French in 1749 and named Fort Rouille. Later it was known as York. It was incorporated as a city in 1834 with the name of Toronto. It is the legal, educational and legislative center of the province. Osgoode Hall with its court-rooms and law-library, named after Chief Justice Osgoode and centrally located in spacious grounds, is a center of attraction for visitors. The parliament-buildings, stately and handsome brown-stone structures in the park, and the group of buildings near by, devoted to the growing work of the University of Toronto, deservedly are objects of local pride. The main building of the university is, architecturally, one of the most imposing on the continent. Near these are Wycliffe, McMaster, Victoria and St. Michael's Colleges and, at no great distance, Knox and Trinity Colleges. The educational institutions attract 10,000 students. Only a few universities in the world have a larger roll-call than Toronto University. The city rises gradually from the lake northwards, and a number of streets in its northern portion, the residential part, are noticeably beautiful. Industrially Toronto is making great progress. The value of the annual output is near $100,000,000. One department-store alone (T. Eaton Company) employs 4,000 hands. In 1906 electric power was brought to the city from Niagara Falls, and cheap power unlimited in quantity so easily obtained will attract capital and further build up industries. The city is well-provided with hospitals, libraries, churches and parks. Its electric railway has nearly 100 miles of track, and each year carries nearly as many millions of passengers. The leading railways, the Canadian Pacific, Grand Trunk and Canadian Northern, contribute to its growth. Steamers, passengers and freight cross to Niagara (Lake Erie) and to Kingston and points east, including Montreal and Quebec, across Lake Ontario. Americans in great numbers visit Toronto each summer. The island, stretching along the front of the city. dotted with summer residences and hotels and overlooking the great lake, is attractive to citizens and visitors alike. Its ready accessibility (within a few minutes of the heart of the city) makes it a most valuable asset. Population 600,000. See CANADA and ONTARIO.

Torpe'do, the popular name for electrical fishes closely related to the skates and rays. They are capable of giving electrical shocks, and are also called cramp-fishes. There are 15 or 20 species inhabiting mainly the warmer seas, but one species is found on the Atlantic coast from Cape Cod south. It has a broad, disk-shaped body with a stout tail and reaches a length of three to five feet. It is black above and whitish below. The electrical organs in all these fishes consist of two clusters of six-sided prisms, one on each side between the head and the broadly expanded pectoral fin. There are about 500 prisms in a single organ. The latter is richly provided with nerve-fibers, and the discharge is under the control of the fish.

Torpedo, an apparatus or machine designed to destroy ships by blowing them up with an explosive. Torpedoes are either stationary, floating or moving. Stationary and floating torpedoes are used in defensive operations, as in harbors or rivers. They are placed in the harbor, either being anchored or allowed to drift within certain limits, and so arranged that they explode by contact with a ship or can be exploded by an electrical contact from some convenient point. Moving torpedoes are projected through the water, either on or below the surface, and explode upon coming in contact with a ship. They may depend for motion wholly upon the original force of projection, or they may be supplied with some motive power by which they move themselves. When they are projected, they are usually discharged by compressed air from a long tube called a torpedo-tube. Many war-ships are fitted with these torpedo tubes, but special boats called torpedo-boats and submarines are more often used for the purpose. A torpedo-boat is a small, fast steamer fitted with appliances for launching torpedoes. Larger steamers having great speed and equipped with fast-firing guns are employed for protecting the large cruisers and battleships from torpedo-boats. Such boats are called torpedo-destroyers. Torpedo-destroyers are also supplied with torpedoes and torpedo-tubes for offensive operations.

Submarines employed by the Germans worked great havoc among merchant vessels during the European war, but did little damage to fighting craft. It was further learned by experience that submarines could only be successfully used against merchant vessels where the latter were given no chance to defend themselves, and it was impossible for the submarines to provide for the safety of the passengers and crew, as required by the laws of civilized warfare. The first practical submarine was invented in America by David Bushnell in 1775. It was raised by a screw-shaped oar which extended to the top of the boat. Another oar propelled it through the water, and it was guided by a rudder. Valves admitted water to help it sink. Hand-pumps discharged the water when it was desired to rise. Attached to the vessel in the rear was a powder magazine, connected by a rope to a wood screw in the forepart of the boat, which the operator attached to the bottom of the vessel to be attacked, leaving the powder magazine to be exploded by a time-fuse. An attempt was made to blow up a British warship with this device, but without success. Robert Fulton (*q. v.*) completed several submarine boats and interested Napoleon in one of them. The first mechanically driven submarine was built in France in 1863. During the Civil war the confederates built several submarines, some of which were propelled by steam and some by hand. One of the latter attacked the Housatonic and sank her. The first submarine of the type employed in the European war was also an American invention—the work of J. P. Holland. Two of the most important features of the Holland boat were that the gasoline engines, which were substituted for the steam engines, formerly used, were employed when the boat was afloat for charging the electric accumulators. Upon submerging the engines ceased to operate and the boat got its power from its accumulators. Another feature was the periscope—a telescope with an arrangement of mirrors, so that those in the submarine can sight a vessel on the surface of the water while the submarine is submerged. On sighting a vessel which it is proposed to attack, the funnel of the submarine is taken down, openings closed, protective coverings of the tower removed, the lid of the entrance-way closed, sufficient water admitted into the tanks in the outer hold to cause the vessel to sink, leaving exposed only the periscope; the whole operation occupying only about five minutes.

Torpedo-Boat. See TORPEDO.

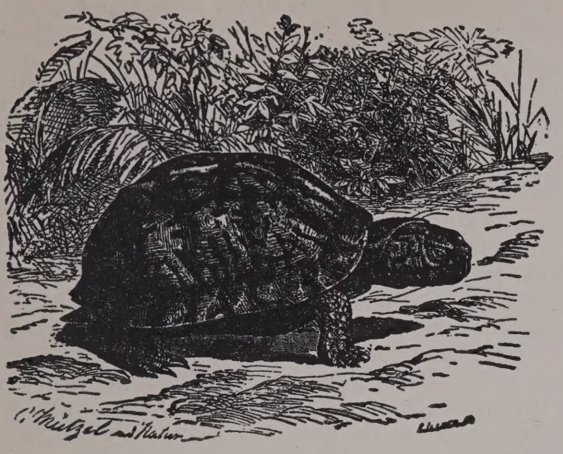
Torquemada (*tôr kā-mä'thä*), **Tomás de,** a Spanish monk, was born at Torquemada, Spain, about 1420. He was a Dominican friar, and was made inquisitor-general for Spain in 1483 He is famous as the organizer of the Inquisition, with its tribunals at Seville, Cordova and Toledo. He was too zealous even for the perscuting spirit of the age, and Pope Alexander VI appointed four colleagues to hold him in check. He obtained the expulsion from Spain of the Jews and Moors. He died at Avila, Sept. 16, 1498.

Tor'rey, John, an American botanist, was born at New York, Aug. 15, 1796. While studying medicine in New York, he founded the Lyceum of Natural History. He was professor of natural sciences at West Point for three years, of chemistry at Princeton, and also had the same chair in the medical college at New York. His reputation as a chemist brought him the position of United States assayer, which he held for nearly 20 years. The results of his work on the state geological survey of New York and on several United States exploring expeditions are found in *Catalogue of Plants Growing within Thirty Miles of New York City*, *Flora of New York*, *Flora of the Northern and Middle States* etc. His fine botanical library and the collections of 40 years he gave to Columbia College, New York City. He died on March 10, 1873.

Torricelli (*tŏr'rē-chĕl'lē*), **Evangelista,** an Italian physicist, especially remembered as the inventor of the mercurial barometer. He was born at Faenza, Oct. 15, 1608, and died at Florence, Oct. 25, 1647. His work was largely inspired by the writings of Galileo, whose pupil and private secretary he was during the last three months of Galileo's life. Torricelli substituted mercury for water in the barometer and found that it rose only 30 inches instead of 33 feet in a closed tube. This led him to the conclusion that in each case the cause of the ascent is the pressure of the earth's atmosphere. This conclusion was shortly afterward clinched by Pascal, who carried a barometer to a mountain-top and found that the mercury fell as he ascended. Besides two important theorems in the mechanics of solids, Torricelli enunciated the theorem that a liquid flows from an orifice with the same speed that it would have acquired in falling freely from the surface of the liquid to the level of the orifice. See BAROMETER.

Tor'rington, Conn., a town and borough in Litchfield County, on Naugatuck River and on the New York, New Haven and Hartford Railroad, 17 miles north of Waterbury and 25 west of Hartford. Settled in 1737, three years later it became a town, and in 1887 was incorporated as a borough. It is actively and largely interested in manufactures, aided by the facilities of good waterpower. Among its products are woolen goods, machinery, iron and brass castings, plated goods of copper, nickel, silver and gold, furniture, bicycles, needles and machine-tools. Its public buildings include a library, high and elementary schools, municipal buildings and churches. It also has the fine park called Coe Memorial Park. Population about 16,840.

Tortoise (*tôr'tĭs*), a name loosely applied to any turtle, but more correctly restricted to particular members of the turtle family. The true tortoises are land-turtles, represented in the United States by the wood-tortoise, the box-tortoise and the burrowing turtles of the southern states. They feed upon plants and fungi. Their shell usually is highly arched, with the hard plates showing concentric markings. Their nearest relatives are fresh-water species like the painted and speckled turtles, which sometimes are incorrectly called tortoises. The so-called tortoise-shell comes from a salt-water turtle, called the hawksbill. See Terrapin and Turtle.



BOX-TORTOISE

Tortug'as. See Dry Tortugas.

Tor'ture, a means of extorting confession of guilt by inflicting severe pain. It was used at first on slaves, and with the Romans on those who were not Roman citizens. Paul protested against the use of it, saying: "Is it lawful to scourge a man that is a Roman uncondemned?" Under the emperors the use of it became general, extended through Europe, and reached its severest form in the tribunals of the Inquisition. The scourge; the rack, which stretched the whole body, sometimes until the joints were dislocated; the boot, rings of iron around the legs with wedges driven in until the flesh was mashed to a jelly; and the thumb-screw were among the many hideous instruments used. Judicial torture in England was inflicted only by order of the sovereign, and the last use of it was in 1640. France abolished it in 1786; Russia in 1801: and Austria, Prussia and Saxony about the middle of the 18th century.

To'rus (in plants), the same as "receptacle." See Flower.

Toscanelli del Pozzo, surnamed Paul the Physician, was born in Florence, Italy, 1397, and died there in 1482. He distinguished himself as an astronomer and physician. For a number of years he had charge of the celebrated library founded at Florence by Nicolo Nicoli. He read the accounts of the travels of Marco Polo and met many travellers from foreign lands. These experiences, with his knowledge of astronomy, convinced him that a western route to the Indies was possible. He corresponded with the king of Portugal and with Columbus on the subject, and prepared maps to show the proper course for such a voyage. These papers were in possession of Columbus in 1492.

To'tal Ab'stinence or **Tem'perance.** The abuse of intoxicating liquors early led to the formation of temperance societies to influence public opinion on the subject and help those who were endeavoring to overcome the appetite for strong drink. The first temperance society in the United States was formed at Litchfield, Conn., in 1789 by 200 farmers who pledged themselves not to use liquors in carrying on their farm-work. Early in the 19th century the temperance movement became organized, and the churches, especially the Methodist and Presbyterian, were active in the work. The Massachusetts Temperance Society was formed in 1813, and the American Temperance Union in 1826. The early societies were temperance societies strictly, not total abstinence organizations. They did not oppose the use of wine, cider or malt liquors, a brewery being built in Boston by the temperance reformers. The first national temperance convention met in Philadelphia in 1833, and formed a national temperance union, with 23 state societies and over 7,000 other societies. "Total abstinence from all that intoxicates" was first insisted on in 1833 by the Massachusetts Society.

The Washingtonian Temperance Society was formed by six reformed drunkards at Baltimore in 1840, and was very successful in its special work of reforming hard drinkers. The Sons of Temperance was another society which in 1850 numbered about 240,000 members. The Good Templars, another temperance order, founded in 1852, is a secret society with passwords, grips etc., with a membership of about 750,000. A remarkable movement in the temperance cause is what is known as the Women's Crusade, which began in Hillsboro and Washington Court House, O., in 1873. It was a crusade against saloons, and the weapons used were prayer, persuasion and persistence. The movement spread rapidly and was the means of closing many saloons, in some places all that were in operation. The Woman's Christian Temperance Union is the successor to this temperance crusade. It has organizations in every state, territory and dependency of the United States and in some fifty other nations. Its work includes thirty departments, some of which are Americanization, Women in Industry, Relieve Work for Soldiers and Sailors, Work among Colored People, Child Welfare, Scientific Temperance Instruction in Public Schools and Colleges, Medical Temperance, Temperance and Missions.

The headquarters of the National W. C. T. U. are at Evanston, Ill., under the same roof with the former home of Frances E. Willard. In addition it owns a commodius brick business building in which are the editorial rooms, publicity bureau, business offices and publications of the organization. Besides its campaign and department literature, the National

W. C. T. U. publishes two periodicals—*The Union Signal*, the weekly official organ, and *The Young Crusader*, a monthly paper for children. The W. C. T. U. motto is: "For God and Home and Native Land"; its badge a bow of white ribbon.

The first laws against the use of liquor were made in Massachusetts in 1639 and about the same time in Connecticut. Oglethorpe in 1733 had the importation of rum into Georgia prohibited as well as of slaves. In 1756 a duty was imposed on imported liquors in Pennsylvania, and in 1774 the first Continental Congress proposed to the different states the passage of laws to stop the distilling of liquors. The ration of grog in the army was changed to coffee in 1832. License laws were passed in some states, but met with strong opposition. After the supreme court had in 1847 decided in favor of prohibitory laws, Maine was the first state to use the power. Delaware, Rhode Island, Vermont, New Hampshire, Massachusetts, Michigan, Iowa, Indiana and Kansas all passed laws prohibiting the sale of liquors, but the law was repealed later in most of the states and license laws substituted. The Prohibition party grew up from the effort to induce state and national legislation favorable to prohibition.

In recent years the liquor problem has been severely scrutinized all over the world. The open bar is more and more regarded as a nuisance, an injury and a peril to society and the state. Consequently public opinion against the saloon has made itself felt throughout Europe as well as in America, Canada, Australia and New Zealand. Both Great Britain and the United States are increasingly limiting the number of places at which intoxicating liquors are retailed and reducing the area of the influence of drink. In 1904 English local magistrates were given power to refuse to renew licenses for saloons that they consider needless, compensation being given to the ousted liquor-dealer, and in 1908 it was enacted that after 1922 compensation shall *not* be paid and that magistrates shall be free to close as many houses as they see fit. Since April 5, 1909, the people in any locality have had the power to prohibit the granting of any *new* license. In the United States, however, greater progress was made in the regulation of the liquor-traffic than in any other country. One of the efficient organizations under which the great crusade was carried forward after 1903 was the Anti-Saloon League, the platform of which had but one plank—*The Suppression of the Saloon.* It thus had the support not only of those of strict temperance views, but of large numbers who, while not total abstainers, were alive to the evils and the menace of the open saloon. The effort of the Anti-Saloon League first secured the enactment of local option laws, under which the voters in village, town, township, city, county or state determined by a majority vote whether or not intoxicating liquors should be sold in the political division in which the vote was taken.

When the aggregate of prohibition districts under local option was sufficiently large the next step was taken—adoption of a constitutional amendment. Nearly all states came to have some form of local option; and the territory under prohibition steadily increased so that it came to include more than half the states of the Union and the number continued to increase with each election.

On December 18, 1917, Congress passed what was known as the Webb resolution submitting to the states an amendment providing for the suppression of the liquor traffic one year after the ratification of the amendment by the required thirty-six state legislatures.

Nebraska on January 16, 1919 ratified the amendment, making the thirty-sixth state to do so, thus insuring nation wide prohibition beginning January 16, 1920.

To'tem, a carved or painted symbol, in use among the American Indians and the primitive peoples of foreign lands to indicate kinship and the special tribe to which they belong. These symbols are very varied in character, including things inanimate, as trees, plants and the heavenly bodies — the sun, moon or stars; as well as objects of animate life, as birds, beasts and fishes. These, when adopted, become the hereditary tribal mark and the indication of clanship, and are not only found on the tribal totem pole, but are frequently indicated on the person of members of the same tribe by tattooing or burning the rough symbol into the skin. These totems are sacred to the tribe adopting them, and in the case of animal, bird or fish life, they are withheld from eating or destroying them. They thus become a sort of blood-bond, and in some instances they restrain marriage among those who adopt a certain tribal symbol or totem. A considerable literature deals with the subject of totemism in different lands, as well as with kinship and marriage and the tribal customs among early races of mankind.

Toucan (*tōō'kan*), the name for birds with enormous, bright-colored bills, inhabiting South America and ranging as far north as Mexico. The bills are light, as they are filled with air-cavities. These birds feed on bananas, insects and reptiles. They frequent lofty trees. They are sometimes confused with the horn-bills of Africa, birds with greatly enlarged bills but belonging to a different family.

Touch (*tŭch*), that one of the five senses by which contact or pressure is perceived. It also is usually made to include the senses of temperature and pain. It is possessed more or less acutely by all parts of the free surface of the body, walls of the mouth and nasal passages. Its delicacy depends upon the number of particular touch-organs in a square inch and also on education. The blind, for example, can be taught to read by passing their fingers over raised letters, and physicians and some artisans acquire an educated touch of remarkable acuteness. Touch is most accurate in the tip of the tongue; the palm of the forefinger stands next; and the back is the least sensitive to contact. The whiskers of cats and other similar organs increase the efficiency of this sense. As regards the temperature of sense, it has been shown that there are distinct hot and cold spots lying close together on the surface of the skin.

Toulon (*tōō'lôn'*), a city of France, on the Mediterranean, 30 miles southeast of Marseilles. It is on a double bay, sheltered by mountains, and has the largest military port on the Mediterranean, covering 240 acres, with large buildings, arsenals and floating docks. The cathedral, town-hall, military and naval schools and theater are among its finest buildings. Shipbuilding and the trade connected with the military and naval works are the principal industries of the city. Toulon was used as a harbor by the Romans. The fine fortifications built to protect the city from pirates withstood an attack of the English and Dutch fleets in 1707. The English captured the city in 1793, but were driven out by Napoleon. Population 103,549.

Toulouse (*tōō'lōōz'*), a French city on the Garonne River, 130 miles southeast of Bordeaux. The beautiful church of St. Sernin, the cathedral, a fine museum of art, a public library, an observatory and an arsenal are among its attractions. It has manufactures of woolen and cotton goods, cutlery and hardware. Toulouse was the capital of the Visigoths in the 5th century. From the 8th to the 13th century it was governed by counts or dukes, and was then attached to the French crown. The battle of Toulouse, in which Wellington was victorious over the French under Soult, was fought on April 10, 1814. Population 149,438.

Tourgee (*tōōr-zhā'*) **Albion W.**, an American author, was born at Williamsfield, O., May 2, 1838. He studied at the University of Rochester, N. Y.; enlisted as a private in the 27th New York volunteers; was wounded at Bull Run and at Perryville; and was held a prisoner for four months. He moved to North Carolina, where he was prominent in the reconstruction of the state, drawing up the constitution and aiding in the revision of the laws. His writings, besides legal works, include *Toinette*, *Figs and Thistles*, *A Fool's Errand* and *Bricks without Straw.* In 1897 he was appointed consul to Bordeaux, France. He died on May 21, 1905.

Tourmaline (*tōōr'mȧ-lĭn*), a mineral found in granite, gneiss and sometimes in sandstone. The color varies according to the materials tourmalines are made of. The blue, pink and green ones have little iron, while the black ones probably are colored by iron. Silica, boric acid, alumina, lithia, soda, lime, magnesia etc. enter into their composition. Tourmaline is found in Maine, Massachusetts, New Hampshire and Vermont in red, green and blue crystals, while brown ones are found in New York and very fine black ones in California. In the Ural Mountains, the island of Elba and the St. Gothard fine specimens are found. See *The Tourmaline* by Hamlin.

Tournament (*tōōr'nȧ-ment*), a military festival or contest. They were usually contests between knights on horseback, and the name came from the skill needed in turning their horses. If only two knights contended, it was called a joust; but several combatants made it a tournament. Invitations to a tournament were given by princes or nobles through heralds, and the attending knights came with large retinues and gay banners, while crowds of gaily dressed spectators filled the seats around the place of contest. The rules of the tournament prescribed the kinds of weapons to be used, the mode of warfare and the rank of those who might enter the lists. The prizes awarded by judges were given by the ladies. The early tournaments were like the gladiatorial shows in Rome, often resulting in the death of the combatants, and were for a time forbidden in England and opposed by the church, but during the crusades they came into favor and flourished as court pageants until Henry II of France received a fatal wound, when they were abolished in Europe. See *Ivanhoe* by Scott.

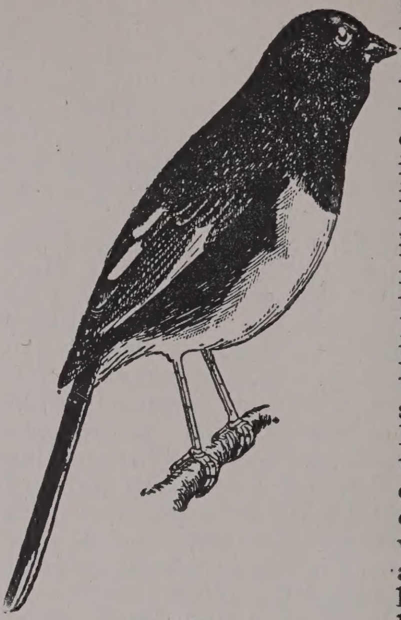
Tours (*tōōr*), a French city, at the junction of the Loire and Cher Rivers. The finest bridge in France crosses the Loire. There are two towers standing of the famous Church of St. Martin. Tours is known for its silk-manufactures, being the first place to introduce the trade, which was so extensive that it had 80,000 inhabitants when the repeal of the Edict of Nantes drove away its best artisans. The states-general of France met in Tours at different times during the 15th and 16th centuries. It was occupied by the Germans in 1871. Population 67,601.

Toussaint (*tōō'săn'*), **François Dominique,** called also L'Ouverture, the black chieftain of Haiti, was born of slave parents near Cape François, Haiti, in 1743. In 1791 the mulattoes and blacks made a struggle for their rights, and Toussaint, after helping his master to escape with his family to Baltimore, joined the army and soon became a general, capturing the white army without bloodshed. The black leaders at first accepted the help of the Spaniards, but when the English invaded the island, where French and Spanish and colored troops were all contending, Toussaint declared for France, which had proclaimed freedom for the slaves. He joined the French leader, drove the English and Spanish from the island, and was made commander-in-chief of Santo Domingo. The civil war between the mulattoes and blacks ended in the whole island becoming subject to Toussaint, who governed it under the French. He selected a council of nine members, composed of eight white citizens and one mulatto, which chose him president for life. The constitution adopted was sent to France; but Napoleon, the first consul, said: "He is a revolted slave whom we must punish." A fleet of 30,000 men and 66 war-vessels was sent to Haiti to re-establish slavery, and after ineffectual efforts to conquer the island offers of peace were made, promising with solemn oaths the liberty of the people and that Toussaint should be retained in power. He signed the treaty of peace on these conditions, but was seized treacherously with his family, and sent to France, where he was imprisoned without trial or accusation in a cold, underground dungeon at Besançon. He sent appeals for trials and his defense to Napoleon, but got no answer. At last, worn out with cold and left four days without food or drink, he was found dead in his cell on April 27, 1803. Whittier and Wordsworth have embalmed the name of Toussaint L'Ouverture in their poems. Wendell Phillips made him the theme of an oration.

Tow'er, Charlemagne, an American diplomat, was born at Philadelphia on April 17, 1848. He graduated from Harvard University (1872), spent four years in Europe, and in 1878 was admitted to the bar. He became active in business affairs, including railroad interests and mining, for some years; but in 1891 he began to devote himself exclusively to history and archæology, and became a professor in the University of Pennsylvania. He was appointed United States minister to Austria-Hungary in 1897, ambassador to Russia in 1899, and ambassador to Germany in 1902, retiring in 1908. He has published *The Marquis de La Fayette in the American Revolution* and *A Catalog of a Collection of American Colonial Laws.*

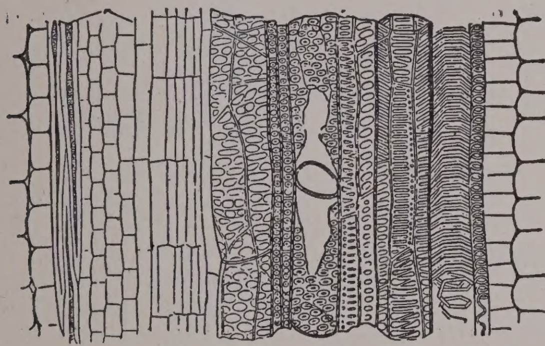
Tower of Lon'don, a famous ancient citadel erected by William the Conqueror about 1078 to dominate the city. It is in the oldest part of the British metropolis, on the north bank of the Thames, about a mile below London Bridge. It is surmounted by a keep, known locally as the White Tower, — the council chamber of the early kings. The Tower is historically notable for the many distinguished persons — traitors and others — who have been confined within its walls as prisoners of state or have met death on the scaffold or at the headsman's block on the adjoining Tower Hill. In modern days it has become the repository of the national arms; and since the restoration the *regalia* or crown-jewels have been kept in the Tower on exhibition.

Towhee or **Cheewink,** member of the finch family. The bird is smaller than the robin, the color of its sides a rich, reddish chestnut, below white, upper part black, tail tipped with white. The call-notes give it its names; its song, simple and pleasing, is heard from among the branches. Favorite haunts are thicket and scrubby wood. It forages on the ground, is expert in unearthing wireworms, beetles and larvæ, and has special liking for hairy caterpillars and potato-bugs. It nests on the ground, the nest seeming a very part of the soil, the eggs white marked with dull brown, in number four or five. The birds migrate in April, September and October, the breeding-range extending from the lower Mississippi valley and Georgia northward to Maine, Ontario and Manitoba. It sometimes is called ground-robin.


TOWHEE

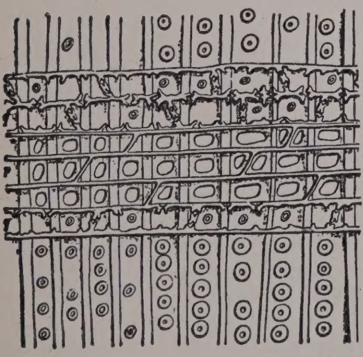
Town-Meet'ings are held annually in the New England towns for general discussion, the election of officials and the voting of taxes. A town in New England does not necessarily mean a small city; but, rather, a unit for the administration of local government, often mainly rural. The township system is much more important in New England than elsewhere. It dates from the days of independent, local governments by the Pilgrim Fathers and the Puritans, when the town was essentially the church, and the church was almost the state. The New England town-church was intensely democratic. Thus the town-meeting as still practiced in New England affords the most perfect example of a completely democratic government. All the legal voters of the town may appear, and discharge the duties of government, as in some of the Swiss cantons, not through their representatives but in person. The colonial legislatures left the townships to govern themselves almost without interference, except where the colonial laws might happen to be transgressed. Town-meetings were at one time held about once a month; and even now special meetings in addition to the annual meeting are occasionally held. But the usual type of town-meeting is that which meets annually, elects a committee of selectmen and such officials as the town-clerk, the tax-assessors, the treasurer, the school-trustees and the overseers of the poor. The officials so named may themselves constitute the board of selection. The New England town-meetings resemble the Old-English town-moot; but seem not to have been direct imitations of it.

Trachea (*trā'kē-ȧ*) (in plants), the characteristic element of wood or xylem, the tracheæ together constituting the tracheary tissue. A trachea is a vessel composed of a single, elongated cell or of several cells set end to end. The cells usually are of large caliber, with very heavy walls, which are variously thickened. In some cases the thickening consists of a spiral band, in others of distinct, encircling rings. Frequently the thickening of the walls leaves definite, thin spots, called dots or pits. In this way the spiral, annular and dotted ducts or vessels are formed. The tracheary tissue is chiefly concerned in the conduction of water from the roots to the leaves; and frequently it is an important or even the chief mechanical support of the body.



Vertical section of stem from the epidermis (at the left) to the pith (at the right), the vessels or tracheæ being recognized by their large size and by their pits and spirals.

Tracheid (*tra'kē-ĭd*) (in plants), a single cell with all the wall features of a trachea, but not uniting with others to form a vessel. It is more or less elongated and taper-pointed like a fiber. Tracheids form the characteristic soft and straight-grained wood of pines and other conifers. In these forms, as in all gymnosperms, the walls of the tracheids contain bordered pits, that is, pits which appear to have a double border about them. This type of pit is a constant feature in gymnosperms, so that the group may be recognized even by a single wood-fiber.



Vertical section of pine wood, showing the pitted tracheids crossed by a pith ray.

Track-Events are sports practiced on a circular path. They comprise running and hurdling. Running includes sprinting for 50, 100 or 440 yards and runs of ½, 1 and 2 miles. Hurdling is sprinting for 120 or 220 yards and leaping 10 hurdles, those of the longer course being 2½ feet in height, those of the shorter course a foot higher. The hurdles of the long course are 20 yards apart, but on the short course the first hurdle stands 15 yards from the start, the next eight are ten yards apart, but the tenth is 15 yards away. Hurdling demands judgment and skill as well as strength and speed.

Trade-Mark, the name or device used to distinguish the merchandise of a firm from that of others. Trade-marks are protected by law in nearly all countries, in order to protect buyers from frauds and enable a merchant or manufacturer to profit by the superiority of his goods. In the United States a merchant or firm registers its trade-mark in the patent-office (*q. v.*), and is entitled to its use for 30 years and to renew it for 30 years more.

Trade-Routes. Many of the trade-routes of the world have been discussed under Caravans and Ocean-Routes; and it will here suffice to describe the chief trade-routes leading from America and Great Britain. In ancient times the chief trade-routes were overland; at present they are over sea. From the days of the ancient Phœnician traders to the 15th century the only important sea-routes were the coastal routes of the Mediterranean and Atlantic. But Vasco da Gama's discovery of a way to India around the Cape of Good Hope in 1497 and that of a supposed route to Asia by Columbus in 1492, followed as they were by a host of similar explorations, opened great oceanic highways. The chief of these routes were those to the West Indies and South America, to India around the Cape of Good Hope, to the East Indies *via* India and to the Pacific through the straits discovered by Magellan in 1520. By the discovery of these routes a change was made in the focus of commerce from the Mediterranean cities to those of western Europe. The great trade-routes of the ancients led to and from such cities as Tyre, Sidon, Ephesus, Carthage and Rome, and those of the middle ages were focussed at Venice and Genoa, all being Mediterranean ports.

Spain and Portugal took the lead in the trade of the 15th and 16th centuries; but were soon eclipsed by Holland and England. The greatness of the trade of France, America and Germany is of later development, although as early as the beginning of the 18th century France was a formidable rival of England in America and the Indies.

The trade-routes of the United States may be mentioned in connection with the chief cities. Portland (Maine) in New England has a shipping-trade with Canada during the winter, when the St. Lawrence is frozen. From Boston, Mass., vessels trade mainly with Europe; but also to all parts of the world, even to Australia for wool. Boston also is a terminus of an overland trade-route by rail with the west, whence come grain, meat and raw materials for manufacture. In the Middle Atlantic States New York is a center of trade-routes to all parts of the world. Produce from the western states is conveyed here by rail for exportation. Philadelphia is a great shipping-port for coal to the southern states and New England; and also has a large canal and railroad trade. The shipping-routes from Norfolk to New England and England are due largely to the cotton-trade. In the south New Orleans is the terminus of trade-routes to the Mediterranean, England and France The rich produce of the Mississippi Valley and the cotton of the extreme south form the staple of its trade. The chief trade-routes between the United States and Canada are across the great lakes, *via* Chicago and *via* Buffalo to Montreal. The leading trade-routes from the Pacific Coast are to Japan, to China, to the Philippines, to Australia and to the eastern coast of South America The Panama Canal, when completed, will open a new route not only from America but from Europe to the Pacific.

Britain is the principal center of the trade-routes of the world, especially through the ports of London, Liverpool, Glasgow and Belfast. The *Atlantic route* from British ports runs directly to New York, Boston, Philadelphia, Baltimore, Norfolk, Charleston and New Orleans. These ports are reached without the need of an intermediate coaling-station. The *Cape route* is to South Africa and Australia the Cape of Good Hope. The *Suez route* passes through Suez Canal; and commands the trade of southern Asia, the East Indies and, partly, Australia. The ports along this route, most of which are fortresses, include Gibraltar, Malta, Aden, Perim, Singapore and Hongkong. The *Plata route*, which takes its name from Plata River, leads to Brazil and Buenos Ayres. A few vessels still go round Cape Horn to Australia by this route. The *West Indian route* leads to the West Indies and Mexico; and with the completion of the Panama Canal will no doubt be extended to the Pacific Coast and Polynesia.

Trade-Schools. Under modern conditions of industry the old-time period of apprenticeship to a trade or handicraft is being supplanted by a course in a trade-school. The object in trade-schools is to give the pupil in the shortest possible time such a knowledge of the underlying principles of a particular trade and such practice in the use of its tools, that he will be able immediately after graduation to do competent work and earn good wages.

New York Trade-School was the first institution of its kind in the United States, having been founded in 1881. Its courses include bricklaying, plumbing, plastering, house-painting, steam-fitting, electrical work, blacksmithing, sign-painting, fresco-painting, steel and other metal work and drawing. Both day and night classes are conducted, and the tuition fees are merely nominal.

Several trade-schools have been endowed by private persons, sometimes with the object of enabling poor boys to learn a trade, sometimes to furnish skilled tradesmen from our own nation instead of being under the necessity of importing them from abroad. Few trade-schools have yet received state aid.

A number of large manufacturing establishments, as Hoe and Co., printing-press manufacturers of New York City, have devised a scheme of apprenticeship whereby their young men are enabled to become all-round mechanics rather than masters of only one small process. Evening classes are utilized to this end, in which instruction is given in mathematics, mechanics and drawing.

Some of the principal trade-schools in the United States are New York Trade School; School of the Philadelphia Builders' Exchange; Williamson Free School of Mechanical Trades, Philadelphia; Pratt Institute, Brooklyn, N. Y.; Waltham Horological School, Waltham, Mass.; Elgin Horological School, Elgin, Ill.; Ohio Mechanics' Institute, Cincinnati, O.; and Lowell Institute of Practical Design, Boston.

Trade-Winds are winds of the intertropical zone and of a region on each side of it for a short distance which blow from the same quarter all the year through, unless they are affected by local causes. North of the equator their general direction is from northeast to southwest, but south of it they blow from southeast to northwest. In some places they blow in one direction for half the year, but in the opposite direction for the other half. They are caused by the earth's rotation and the air's movement from the poles to the equator. The hot air rises, the cold air comes in its place, and the earth's rotation changes the direction of this from due south to southeast or from due north to northeast. It is only over the open ocean that they are continuous. The larger the ocean, the steadier the trade-winds. Hence, those of the Pacific blow more regularly and strongly than those of the Atlantic. They are separated by a belt of calms (*q. v.*) or of variable weather. Their name comes from tread, which sailors pronounced trade, because they tread so steadily. But it also is said that they are named because of their usefulness to marine trade.

Trade-Unions. A trade-union may be defined as a continuous association of wage-earners, primarily for improving conditions of employment, secondarily for any form of mutual benefit and protection. In the strictest sense it is a combination of wage-earners engaged in the same industry or the same trade. Thus the carpenters' union is of men engaged in the same trade; the United Mine-Workers' Union is of men engaged in the same industry, though of several trades; miners proper, as well as blacksmiths, firemen, etc. The Knights of Labor, on the other hand, was not a trade-union at all, as it included men who were not wage-earners; in fact, any one over 16 might join, provided he sympathized with the purposes of the order.

Trade-unions are distinct from trade-guilds of the middle ages and the succeeding centuries so far as the latter consisted either of masters or of men who, in the normal course of affairs, would become masters. The trade-union proper came into existence only when there was created a sharp distinction between wage-earners as a class and employers as a class, a distinction that arose only with the rise of methods in production that require considerable capital. Thus a man with much capital sets up a shop in which he employs many men, paying them by the day or week and discharging them when he has no further use for them. In certain lines of business, as tailoring, these shops soon drive out of business the shops where there is but one man or a few partners, with a few apprentices to assist. This innovation spread in England, about the beginning of the 18th century. At once the employees in such capitalistic shops found that, unless they combined and *bargained collectively*, they were liable to a heartless and unbridled tyranny which had been impossible under the old conditions of working; for the employer obviously has a great advantage over the individual employee, which prevents the latter making with the former a free contract in any proper sense of the term. Thus the earliest trade-unions, those of the journeymen-tailors in London and the woolworkers in other parts of England, sprang into being. The laws of England forbade such combinations; but those laws also forbade the employers to pay less than a certain wage, which was regarded as sufficient for decent and healthy living. Between 1756 and 1814, in the desire to secure foreign trade at any cost, the laws controlling wages fell into disuse and were then repealed, while the laws forbidding combinations in restraint of trade were made more rigid and were enforced with great severity against the workmen, but not against the employers. But, working steadily for the good of the men and of humanity generally, Francis Place, whose name should be remembered, though himself an employer, in 1825 secured from Parliament a repeal of the anticombination laws. In 1871 trade-unions received from Parliament full recognition.

In the United States employers and employees started without any definite restriction on combination, though the English law on the subject had some weight on the attitude of the courts. In 1821 Pennsylvania definitely declared trade-unions to be legal; but not till 1843 did Massachusetts follow suit. But the law against labor combinations has never been recognized as binding on the courts of this country. The earliest trade-unions of this country arose in New York City. They were the unions of journeymen-shipwrights (1803), of house-carpenters (1806) and of the famous N. Y. Typographical Society. Since that time the movement has developed on parallel lines in England and in the United States, conditions compelling the English labor-unions to advance somewhat more rapidly.

Between 1825 and 1880 in England and between 1810 and 1880 in the United States the trade-unions as a whole had not learnt the principle of federating the lesser branches into a central organization. The separate unions frequently indulged in useless strikes, foredoomed to failure. The central organizations that came into being from time to time turned to co-operative schemes or to political movements for which the countries were not prepared, usually of a socialistic character. There was no little corruption as well as folly among the leaders. The unions were largely restricted to the stronger trades and to favored localities. Among the noteworthy advances at this time, however, we may note the first provision for a joint conference of employers and employees (1860) held in Great Britain, in connection with the hosiery trade; the formation of some strong national unions, as the typographical union and the national associations of hat-finishers and of locomotive-engineers in the United States; and the adoption of the union label as a sign that the work so stamped has been done under the conditions of payment and employment for which the union stands. The Knights of Labor, established in the United States in 1869, had great success for fifteen years, but have given way to the American Federation of Labor. The Trades-Union Congress, established in Great Britain in 1868, was at first prevented from attaining its present importance because of the restricted character of its membership.

The "new unionism" may be said to date from the year 1880 both in Great Britain and in this country. In Great Britain it was then recognized that unskilled labor should be admitted to the Trades-Union Congress and that missionary work to organize those trades was essential. In 1888 and 1889 the result was shown in two historical strikes in which the employees, enjoying the sympathy of the whole laboring world and of the public generally, won great victories; viz., the strike of the match-girls and that of the dock-laborers in London. As a result, the leaders of these strikes, John Burns and Tom Mann, secured control of the Trades-Union Congress, with many remarkable results. Of these may be mentioned the commencement of political activity, under favorable conditions, culminating in the formation of a labor-party, which may throw its strength to the side of any one of the great political parties which supports labor-policies; the General Federation of Trade-Unions, which in 1902 had a membership of 419,600 and in 1905 2,000,000 members; and the encouragement of municipal ownership, which has made great strides in England. To-day the Federation enjoys great prosperity and is responsible for many excellent laws passed by Parliament for the betterment of the laborer. It is especially to be noted, however, that the English unions insist on keeping the Labor-Representation Committee distinct from the Trades-Union Congress and from the Federation of Trade-Unions, believing that thereby the cause of labor is kept free from political animosities, while their political activity is less closely associated with the socialistic trend of trade-unionism. This policy has had its fruit in the promotion of John Burns to a cabinet position.

In the United States the new unionism was foreshadowed by the formation of the American Federation of Labor, the most important of our labor-organizations. It was not till 1895 that this society awoke to the realization of its possibilities, especially in the organization of unskilled and poorly paid labor. It may be said to have attained its majority at the time of the great coal-strike of 1902–3. In that strike the United Mine-Workers, under John Mitchell, successfully faced one of the largest combinations of capital that exists, the group of mine-owners and railroads that practically control the coal-product of the nation. Labor here showed its solidarity, and had the sympathy of the very people who suffered most from the strike. Between 1890 and 1900 the American Federation of labor increased from about 200,000 to about 550,000, the increase coming between 1895 and 1900. In the next two years it increased to over one million, and now probably includes three millions among the members of its constituent and affiliated associations in the United States and Canada.

Another great federation of labor in this country was the American Labor-Union, organized as the Western Labor-Union in 1898 and changing its title in 1902. This organization is now known as the Western Federation of Miners. It is very influential in the mining states of the west and is affiliated with the American Federation of Labor.

While trade-unions were legalized many years ago in all the states and by the Federal government, and while 15 states have even forbidden employers to exclude a man from employment because of his place in a union, and though cities have required their work to be done by union labor, yet the following dangers still threaten the labor movement: It is a question whether unions do not constitute a combination for the restraint of interstate commerce in the same sense that many trusts do. Again, the boycott, which is a weapon the unions often use, has been adjudged unlawful by some courts, lawful by others. But certain acts which amount to a boycott,—as agreeing to use only goods marked by the union-label and the sending of notices to the effect that a certain house is unfair,—*i. e.*, does not meet the demands of the union,—have been judged lawful. Congress as well as the great majority of the states of the Union has passed a law to permit trade-unions to incorporate; but, as this would make them liable to be sued by employers, they have seldom availed themselves of the privilege.

Arbitration, which involves calling in a third party, is not favored by trade-unions, except as a last resort; but they have, in cases of difficulty, been found much more willing to submit their cases to arbitration than have the employers. Compulsory arbitration is opposed, as it is felt that it would stand in the way where the union is fighting to establish a new principle, a forward step in the conditions of labor. In 1916, at the threat of a general railroad strike, Congress passed a law compelling the roads to make an eight-hour day the basis of pay. This action was criticized as destroying the principal of arbitration.

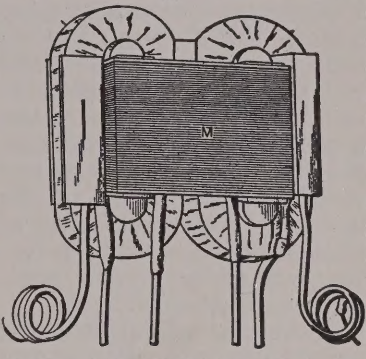
Of foreign countries, other than Great Britain—New Zealand, Australia and Switzerland have been foremost in establishing compulsory arbitration. In New Zealand there is a board of conciliation, which first attempts to straighten out any dispute that may arise. Either party to the dispute, however, may appeal to the board of compulsory arbitration which consists of one employer, one employee and a justice of the supreme court. Its awards are enforced by penalties. Consult Sidney Webb's *History of Trade Unionism;* R. T. Ely's *The Labor Movement in America;* the Industrial Commission's *Report*, Feb., 1902, especially volume 17; and *Reports* of the Bureau of Labor. See SYNDICALISM.

Trade Commission. See Federal Trade Commissions.

Trafalgar (*trăf'al-gär'*), **Cape,** on the southern coast of Spain, is celebrated for the great naval battle gained off its shores, Oct. 21, 1805, by the British fleet under Nelson (*q. v.*) over the combined fleets of France and Spain. The British had 27 sail-of-the-line and 4 frigates, the French and Spaniards 33 sail-of-the-line and five frigates The British captured 19 of the enemies' ships. Nelson was killed but was told of the victory before he died. As Nelson bore down on the French, he hoisted the famous signal: "England expects every man to do his duty." In a storm that night all but four of the prizes were lost or destroyed, a disaster which would not have happened had the dying admiral's order to anchor been obeyed.

Traill, Henry Duff, D. C. L., an English man-of-letters and editor of *Literature*, was born at Blackheath, London, Aug. 14, 1842, and died at London, Feb. 21, 1900. He was educated at Merchant Tailors' School, London, and at St. John's College, Oxford, and joined the staffs of the *Pall Mall Gazette* (1873), the *Saturday Review* (1883) and *The Observer* (1889), and afterwards became editor of *Social England* and of *Literature*. His writings (besides *Lives* of Sir John Franklin, Lord Cromer and Lord Salisbury) include *Central Government; William III* in the Twelve English Statesmen Series; *Strafford* in the English Men of Action Series; *Sterne* and *Coleridge* in the English Men of Letters Series; *Shaftesbury* in the English Worthies Series; *The New Lucian; Saturday Songs;* and *The New Fiction and other Essays on Literary Subjects.*

Tra'jan, Marcus Ulpius, Roman emperor, was born at Italica, near Seville, Spain, on Sept. 18 in 52 A. D. He was a successful commander in the wars against the Parthians and Germans under Titus and Domitian. In 91 his prestige gained him the consulship, and six years later Nerva adopted him as his fellow-ruler and successor. In 98 he became emperor, and celebrated the event by the gift of large sums to the soldiers and to the citizens and their children. He also had the state pay the expenses of bringing up the children of poor freemen in Rome and other Italian cities. In 101 Rome for the first time saw its emperor leading forth his legions in person, when Trajan set out on his first campaign against the Dacians. The conquest of the brave people, who had been paid tribute by the Romans since Domitian's reign, was not finished till 105. After going back to Rome to celebrate this conquest, the first since the time of Augustus, he started to wage war in the east. Armenia, Parthia, Mesopotamia and northern Syria and Arabia were conquered or reconquered, and Trajan was the first Roman general to sail down the Persian Gulf. Trajan's government was of the best. Under his rule the laws were carried out with justice, and the governors were held to strict account. Military roads, canals, bridges and towns were built. Trajan's wall, a line of earthworks from the Danube to the Black Sea, was raised, and Rome was beautified; among the improvements were Trajan's forum and the famous Trajan's column, whose bas-reliefs still tell the story of his military achievements. He died in August, 117 A. D.



COILS AND CORE OF AN A. C. TRANSFORMER

Transform'er, an apparatus for converting the energy of an electric current into the energy of a secondary electric current. There are two kinds of transformers in commercial use: the static or alternating current transformer and the rotary transformer. The A. C. transformer converts a primary A. C. into a secondary A. C., but so that the product of the current and pressure or potential (ampères x volts) of the primary current is practically equal to the corresponding product of the secondary current. Thus, an ordinary electric-lighting transformer transforms one ampère at 1,000 volts into ten ampères at 100 volts etc. This is a "step-down" transformer. In a "step-up" transformer the voltage or pressure of the secondary current is higher than that of the primary current. Transformers are used on account of economy of distribution of electric energy. It requires a much smaller wire to transmit a given amount of electrical energy economically at 1,000 volts pressure than to transmit the same amount of energy at 100 volts. But the higher voltage cannot be well and safely used for many purposes, as for incandescent lamps. So the current is transmitted on the main wires at the higher pressure and transformed down to the lower pressure by an A. C. transformer just before passing into the house where it is to be used. Previous to 1883 practically all the electric lighting from central stations was done by direct current, but the successful application of the A. C. transformer by Gaulard and Gibbs, Stanley and others so reduced the cost of the transmission lines, that within a few years practically all the central-station incandescent lighting was done by the A. C. systems. The A. C. transformer is simply a form of the induction-coil (*q. v.*) but has an alternating current in the primary coil instead of a make-and-break device. It consists of two separate coils of insulated wire, having a laminated-iron core common to both coils. The primary A. C. current is sent through one coil, and this induces a secondary current in the other coil and its circuit. The ratio of conversion is that of the number of turns on the two coils. Thus, to transform from 1,000 volts to 100 volts (a ratio of ten to one), the primary coil has ten turns for every one turn on the secondary coil. Step-up transformers are used on long-distance electric-power lines. Thus, in a Californian transmission-line, the generators can safely generate currents at only 5,000 volts, and 60,000 volts are used on the lines. Here a step-up transformer is used at the dynamo having the conversion ratio of one to twelve, and proper step-down transformers are used at the other end of the line to reduce the voltage for power and lighting applications. The efficiency of the A. C. transformers depends on the quality of the iron in the core and upon the proper proportioning of the parts. In good commercial transformers an efficiency of 98 to 99 per cent. on full load is commonly attained.

In a rotary transformer an alternating current is transformed into a direct current or *vice versa*. A rotary transformer is a form of dynamo-machine having field-magnets and armature similar to an A. C. dynamo, but having a D. C. commutator on end of armature shaft and A. C. collector-rings on the other end. Such a machine is used in central electric-plants where it is desired to generate and transmit A. C., but it is necessary to use D. C. for street-car motors or for electro-chemical processes. See INDUCTION-COIL. A. P CARMAN.

Trans-Isthmian Canal. See NICARAGUA CANAL and PANAMA CANAL.

Trans'it, in astronomy, means the passage of a planet across the disk of the sun or of a satellite across the disk of its primary, that is, the planet about which it revolves. Mercury and Venus have orbits which lie within the orbit of the earth, and so their transit can be observed. The transits of Venus are of great importance, as they are one of the means used to determine the sun's distance. Other methods had been tried without giving accurate results, until Halley in 1716 proposed a method of employing the transits of Venus. Accordingly, the transits of 1761 and 1769 were observed in various places, and in 1842 Encke from these observations reached a generally accepted result. A transit can take place only when the planet is in a line between the earth and the sun. There always are two transits of Venus eight years apart, and then a lapse of 105 or 122 years, when another pair of transits occurs, with eight years between them. The transit of 1874 was followed by that of 1882, but there will not be another until 2004. Mercury is nearer the sun, thus having a shorter orbit and year and therefore more frequent transits.

Trans'it-Instrument, an especially improved and refined telescope, mounted at right angles to a horizontal axis on which it revolves, and used at observatories and meteorological stations for observing transits or the passing of a heavenly body between the observer and another more distant body of larger apparent surface in the heavens. It is used in connection with a clock for noting the time of transit at a given meridian.

Transkei (*trăns'kī'*), is a part of Cape Colony, lying on the coast just south and west of Tembuland. It has an area of 2,552 square miles and a population of 177,730, of whom 1,707 are whites.

Transmis'sion of Pow'er, a branch of mechanical engineering treating of the means of transmitting power from a point where it is generated to the point where it is to be used. For short distances, as in a machine-shop, shafting and belting are commonly used. For longer distances four systems have been used: the wire-rope, pneumatic, hydraulic and electric systems. The above division does not include the indirect method of carrying gas to the point where it is to be used, in a gas-engine or otherwise, nor the method of carrying live steam to considerable distances from the boiler, a method which is only resorted to in extreme cases. The question of transmitting energy not only is one of engineering possibility, but involves economical questions. Some of the questions that have to be considered are the losses along the line of transmission due to friction (mechanical or electrical) or other causes; the deterioration of the installation; interest on the investment; the cost of attendance; the number of horse-power to be transmitted; the number of hours in the year of full load; the cost of power at the two ends of the line; besides questions of convenience etc.

In wire-rope transmission the power is transmitted by a wire-cable carried over pulleys between the two stations. It is used in street-car systems (see CABLE-ROADS), manufactories, mines etc., and for distances up to three miles is commercially efficient, provided the load is large and continuous. Beyond that the efficiency decreases very rapidly, owing to the cost of installation and the dead weight of cable to be carried. In hydraulic transmission water is carried under pressure in pipes or conduits, and hydraulic motors of some form used. The losses in the pipes are decreased by decreasing the velocity of flow and increasing the pressure, but these conditions require large and strong pipes, items adding to the cost of installation and therefore to the interest-charges. The efficiency of hydraulic transmission is always low, 50 per cent. or less, but it is well-adapted for short distances where great forces are required as in lifting large loads and exert-ing great pressures. In pneumatic transmission the power is transmitted by compressed air in pipes to pneumatic engines and tools. It is a system used largely in mining where pneumatic drills are used, and within a few years its use in connection with many machine-tools has greatly extended. Pneumatic tools, as riveting-machines, drills, presses etc. usually are very convenient in operation, and although the mechanical efficiency of the whole system is low, owing to the thermal losses in compressing the air, the use of pnuematic transmission for short distances is increasing, owing to convenience of operation, flexibility and portability of tools. In mining and tunneling it has the great additional advantage of furnishing necessary ventilation along with power. For efficiency, flexibility, economy of operation and cost of operation no system of power-transmission can compete with electrical transmission for longer distances. For longer distances, as 25 to 100 miles, it is the only system by which power-transmission is possible, and even for short distances, as in machine-shops, it is competing with belts and shafts. Many shops and factories are to-day putting in motors for each machine, and thus doing away with belts and shafting. Long distance power-transmission by electricity is the most notable engineering achievement of recent years. It began in the experimental plant of Marcel Deprez at the Munich Exposition of 1882. The line was from Miesbach to Munich, a distance of 37 miles, the power transmitted was ½ H. P., and the pressure was 1,350 yolts. The dynamos and generators were similar Gramme machines. This plant was of small magnitude, but it established the possibility of long-distance transmission. During the next few years power-transmission was developed largely in the way of stationary motors operated on central-station lines and especially in electric railways. (See ELECTRIC RAILWAYS.) Economical transmission of electric energy for long distances requires high voltages, and high voltages cannot be handled easily except in alternating-current apparatus (see TRANSFORMER), so that long-distance transmission was not fully developed until the invention of the successful A. C. motor, the polyphase induction-motor. (See ELECTRIC MOTOR.) In 1891 an experimental line from Lauffen to Frankfort-on-the-Main was shown at the Frankfort Electrical Exhibition, in which over 100 H. P. was efficiently transmitted 110 miles at 20,000 volts by the use of three-phase A. C. apparatus. Since then numbers of large commercial plants have been installed, transmitting many thousands of H. P. for many miles. The Fresno, Cal., Folsom-Sacramento and Niagara Falls plants probably are as notable as any of these plants; but the plants at Lachine Rapids, Montreal, at Portland, Ore., of the Standard Electric Company of California and several plants in Switzerland and Italy are equally interesting to the engineer. In the Fresno plant 1,000 H. P. is transmitted 35 miles by a three-phase system from a water-plant in the Sierras to Fresno. Sacramento, Cal., is supplied by a similar system, with about 4,000 H. P. from the falls at Folsom, 23 miles away. At Niagara Falls 50,000 H. P. is generated by ten dynamos, run by turbines, and the power is distributed as far as Buffalo, 27 miles away. The Standard Electric Company's lines bring electric power into San Francisco and San José from a point in the Sierra Nevada. The electric cars and lighting of San José are supplied by electric currents generated 83 miles away. All these long-distance lines have been built to transmit the power from water-power, but it is one of the plans of the future to establish generating-plants at the mouth of coal-mines and transmit the power instead of the coal to cities within a radius of from two or three hundred miles. See NIAGARA FALLS CITY and NIAGARA POWER-PLANT. A. P. CARMAN.

Tran'spira'tion (in plants), the loss of water by evaporation from a plant. Since 50 to 98 per cent. of the plant-body is water, it loses water whenever the air contains less moisture in proportion to its capacity than the plant. Transpiration therefore is unavoidable under the conditions of most land-plants. To reduce this unavoidable loss, the larger land-plants make the outer tissues of the aërial parts nearly waterproof. But the air-passages (see AERATION) permit evaporation from the cells bounding them; hence the moisture diffuses through the stomata (*q. v.*) to the outer air. Were evaporation prevented by waterproofing these cells also, the absorption of gases for food-making and respiration would be nearly impossible. The amount of transpiration varies greatly in different plants according to their structure and contents; in the same plant it varies with age and the varying external conditions, as temperature, light, moisture etc. Therefore, only a very general idea can be given of the amount of water transpired. On a hot summer-day a plant with five square meters (about six square yards) of foliage (such as a thrifty sunflower as high as a man might have) will evaporate about 1.2 liters (2.5 pints) of water. A birch 40 feet high, with perhaps 200,000 leaves, will give off on a hot day 300 to 400 liters of water (about 2.5 barrels). But these rates would not be kept up as an average through the growing-season. The evaporation from a leaf-surface is 2 to 7 times less than that from an equal area of water.

Transplant'ing, a horticultural process, the transference of plants, as trees, from a nursery or from their native habitat or of young flowers and garden-vegetables to take advantage of the start given them under protection. Tree-seedlings should not be transplanted till the spring following the planting of the seeds. Young trees three or more years old are best transplanted in the autumn when the leaves are falling. Fall-planting enables the small root-fibers to make a start before spring and permits the trees to be cultivated early. The roots should be pruned to leave no ragged wounds. Young trees with a taproot should have it cut to one third its length at the first transplanting. This promotes thrift and makes any subsequent transplanting easier. As about half of a young tree's roots are injured in transplanting, that much or a larger proportion of the top should be cut back. Large trees must be transplanted to soil of the same character as that in which they have been growing. A hole for a large tree, dug in stiff clay, is apt to become a drainage-sink for surface-water, in which the roots are flooded and deprived of air. (See DRAINAGE.) The bottom of the hole should not be concave, deepest in the center, but dome-shaped, deepest at the edge, with a couple of deep post-augur holes for drainage. This shape of bottom conforms to the spreading habit of the roots.

Garden-vegetables are started indoors or in hotbeds (*q. v.*) and are transplanted to give them the greatest advantage of the growing season and to bring the best early-market prices. The seeds are planted in fine, rich earth, usually in shallow trays or pots, and transplanted at various degrees of growth. The treatment of a few common and typical vegetables involving transplanting is given below. Cabbage: The seeds for the early crop are started under glass 30 or 40 days before the ground is fit. Plants from three to five inches high may be transplanted, if properly hardened, to the permanent patch, in middle latitudes, as early as May first. Celery: Seeds are sown under glass in February; small plants are transplanted for thinning out when large enough to handle, when the taproot is destroyed; they are transplanted a second time when well-established. In the final transplanting the plants are set in trenches or on the ground, and are covered. Lettuce comes up very thick, and, if sprouted indoors, may be transplanted when large enough to handle. Tomato: Seeds are started eight or ten weeks before setting out of doors, and are transplanted two or three times, using larger pots each time and giving a light dressing of nitrate of soda or of liquid manure. Sweet potato: The tubers are laid three or four inches deep in a hotbed three or four weeks before frost is over. The sprouts are broken from the tuber when four or five inches long and well-rooted, and are transplanted to the field, where they will form vines. Their tips, if cut off six to nine inches long, can also be planted to form other vines. On a small scale the above mentioned and other seeds can be sprouted in window-boxes indoors, but must not be subjected to too great extremes of temperature. See HOTBED.

Trans-Sibe'rian Railway. See SIBERIAN RAILROAD.

Transvaal (*trăns-väl'*), formerly the South African Republic (1833-1902), is a British possession in Africa. It lies between Vaal River and Limpopo River and is bounded by Matabeleland (Rhodesia) at the north; Portuguese East Africa and Natal on the east; the Orange Colony to the south; and Bechuanaland on the west from Orange River to Southern Rhodesia. Swaziland was a protectorate of the former republic, which had an area of 119,139 square miles, but the transfer of the Vryheid and Utrecht districts; of Swaziland; and of part of the Wakkerstroom district to Natal reduced the area to 111,196 square miles. So Transvaal is of quite the same size as Arizona.

Surface and Climate. The land consists mainly of a plateau 3,500 to 5,000 feet above the sea. Lying in the same latitude south as Florida lies north, it has a semitropical climate, which, however, is dry and admirably adapted for settlers from temperate climes. The plateau is bounded eastward by mountains rising 8,275 feet that shut off the winds of the Indian Ocean, while deserts west of Transvaal dry the winds from the Atlantic. It is crossed in the north by the Zand Mountains and in the south by the Witwatersrand (Whitewater Ridge). Its chief rivers are the Vaal and Limpopo, and it has some large lakes. Both the mountains and the plateau are exceptionally rich in coal, cobalt, copper, diamonds, gold, lead, saltpeter, sulphur and tin. The soil, if irrigated, would be well-suited to agriculture, but the rainfall is deficient; and the forests, chiefly acacias, are only of slight extent.

People and Government. The country was first occupied in 1833-7 by Boers from Cape Colony, among them a boy destined to become famous as President Kruger, who named their land Transvaal because it is across beyond Vaal River. In 1856 they became a republic, but factional troubles, unwise administration and wars with the natives led to annexation by Great Britain in 1877. In 1881, in consequence of fighting against England, the republic regained independence, subject, however, to British control over its foreign affairs. The discovery of the Witwatersrand goldfields (1885) attracted great numbers of foreigners, chiefly British, and finally occasioned annexation again to Britain in 1900. (See BOER WAR.) The population is 1,676,611 (that of Swaziland being 99,959), of whom over 300,000 are whites. Only 100,000 of these are Boers, and their chief occupation is stock-rearing, agriculture being only slightly practised. The government is administered by a governor, who appoints a cabinet, and by a legislature consisting of a council and an assembly. The legislature meets annually, but the governor may prorogue or dissolve it, and it can not continue more than five years. Botha, the famous Boer general, is premier, and three other Boers hold cabinet-offices, non-Boers having only two. The government departments include agriculture, lands and native affairs, mines, public works, the secretaryship and the treasury, the minister of mines being the attorney-general also and the minister of agriculture the premier. Pretoria, with a white population of 29,660, is the capital. Johannesburg, the mining center of Witwatersrand, is the metropolis of Transvaal and the fourth city of Africa, having a white population of 120,411. (The high commissioner for South Africa administers Swaziland, but the laws of Transvaal rule it. Only 890 of the people are whites.)

Education and Religion. Education is progressing rapidly, being free wherever an average attendance of 30 children can be had. Out of 258,826 whites in 1904, who were at least five years old, 227,100 could both read and write. Now there are six high schools with 2,081 pupils, 526 country schools teaching 18,858 children, 137 town-schools with 31,131 pupils, 12 colored schools with 1,654 scholars, and 190 native schools with 13,365 pupils. Pretoria has a normal college, Johannesburg a technical institute of engineering and mining. The Dutch Reformed Churches claim 147,319 members; the English Church 68,390; Methodists number 38,152; Jews 15,481; Presbyterians 20,879; Roman Catholics 16,481; Lutherans 64,257; other Christians 24,008; and Brahmans and Buddhists 11,440. The *white* members of the Dutch churches number 143,015; of the Anglican church 55,094; of the Presbyterians 18,682; of the Methodists 17,206; of the Roman Catholics 14,474; of the Lutherans 5,279; and of other Christian churches 14,259. The other members of these churches are non-white. The Brahmans and Buddhists however claimed 747 white coreligionists.

Resources, Commerce, Communications. Industries are hindered by the insufficiency of the communications and particularly by the lack of unskilled labor for the mines. As the natives are not available, coolies are imported. The state's principal sources of revenue are the customs and the mines, but it is by no means self-supporting. The principal imports are provisions, machinery and clothing. The chief exports include gold (over 6,000,000 ounces annually), wool, cattle, hides, coal and diamonds (value in 1906 about $7,500,000). The gold-deposits are among the foremost in the world, gold-mining the supreme industry. Gold was discovered before 1875, and now more than $940,000,000 had been mined. Annually the yield is $129,000,000. John Hays Hammond calculates that $3,500,000,000 remain to be extracted and that within 30 years nearly all the paying deposits will probably have been exhausted. The Pretoria diamond-fields rival those of Kimberley, the world's hugest diamond (*q. v.*) having been discovered in Transvaal. Nearly 2,200 miles of railway are open, about 400 are under construction, and several hundred are projected. The Transvaal and Orange railways are under joint control, and nearly $30,000,000 are to be spent on new roads. There are 2,500 miles of telegraph, communicating with inmost Africa as well as the outside world; 769 miles of telephone; 393 postoffices; and seven great banks, including the postal savings-bank. Transvaal's population should increase greatly for another decade. Even if its gold-mines become exhausted, farming, grazing, manufacturing and the remaining mineral resources ensure the permanence of population and continued prosperity. See BOERS and KRUGER.

Tran'sylva'nia, formerly a principality of the Austro-Hungarian empire, but since 1868 incorporated with Hungary, on the southeast of Hungary, separated from Rumania by the Transylvanian Alps, in which are found peaks 8,000 feet high. Other ranges cross the country, and divide it from Hungary proper. Gold, silver, quicksilver, copper, lead, iron, tin, coal, alum and salt, with such precious stones as garnets, agates, amethysts, carnelians and jaspers, are found. A bed of rock-salt (*q. v.*) from 60 to 80 miles wide extends through the whole country. The valleys are very fertile, and raise large crops of corn, hemp, flax and tobacco. Woolen and silk goods, paper, gunpowder, glass, soap and furniture are among the more important manufactures. The people are made up of various races, as Magyars, Saxons, Rumans, Armenians, Greeks, Jews, Bulgarians and Gypsies, the Rumans numbering about three fifths of the whole. There is a university at Klausenburg (Kolozsvár), opened in 1872. Transylvania belonged to Dacia in the time of the Roman empire, and after being overrun by Huns, Goths, Lombards and Bulgarians was finally conquered by the Hungarians in the 10th and 11th centuries. It was independent in the early part of the 16th century, but in 1713 was annexed to Austria. Area 21,512 square miles. Population 2,284,048.

Trap, a class of igneous rocks, that is, those rocks which owe their origin to fire, called *trappa*, a stair, because they break up in columnar forms, producing cliffs that stand out in great steps on the sides of hills and mountains. They are made chiefly of feldspar and pyroxene. Trap-rocks when freshly broken usually have a green color, some being a very light green and others nearly black; the weathered surfaces are usually rusty in color. Some trap is very compact, looking like flint. Basalt is a dark, heavy variety of trap-rock. The Palisades on Hudson River just above New York City are cliffs of trap-rock.

Trap'ping is a form of the pursuit of animals which is unsportsmanlike and commercial; although it is sometimes employed abroad against lions and other beasts for self-protection. The most familiar form of trapping, perhaps, is the taking of fish. Netting fish is a form of trapping; and is done either by a gill-net into which the head of a fish enters, so that its gills are caught, or by a cast net which extends from top to bottom of the water or by a trawling-net dragged behind a moving vessel. Fish are often trapped in nooses, cages and baskets. Traps for rats and mice generally belong to the *spring*-type. Traps of this kind are sometimes cruelly armed with iron teeth; they may be used against animals of every kind. Some animals, as rabbits, may be trapped in nooses which possess a tightening slipknot. Birds are often taken by such nooses, which catch their feet and hold them prisoners. Large animals are sometimes taken by a *fall-trap*, in which a heavy weight is loosened by a touch in such a way that it crushes the animal beneath This is the principle of the *box-trap* also; but in a box-trap the animal is uninjured by the fall of the lid which imprisons him. An ancient method of trapping large animals is by means of pits loosely covered with earth. This method is laborious, but useful in the case of big game, as bears, elephants, wolves and even lions. Some animals, as deer and wild horses, may be driven down a V-shaped passage into a corral or enclosure. Trapping is an important form of the pursuit of fur-bearing beasts; since it is economical and neither injures the fur nor is apt to terrify other animals. See TRAWLING.

Trasime'nus, Lake. A shallow Italian lake lying between the towns of Cortona and Perugia, about ten miles long by eight in breadth. There was no outlet until 1896, when an artificial one was opened, draining a wide, frequently overflowed margin which has been planted in eucalyptus trees. On the farther removed slopes are olive-plantations. The lake contains three small islands. It is memorable as the scene of Hannibal's victory over the Romans under Flaminius in 217 B. C. Fifteen thousand Romans were slain, 10,000 captured, Hannibal losing only 1,500 men.

Trav'erse City, Mich., the seat of Grand Traverse County, on Grand Traverse Bay, an inlet of Lake Michigan, at the mouth of Boardman River, also on the Grand Rapids and Indiana, the Pére Marquette and the Manistee railroad, 55 miles northeast of Manistee. It is reached also by steamer from Chicago, and has steamboat connection with the chief ports on Lake Michigan. It is situated in a good farming and fruit-growing region, has a fishing-trade on the lake, and is an attractive resort in summer. The Northern Michigan Insane Asylum and State Hospital are located here. The city has 10 miles of paved streets, a $150,000 municipal water and light plant. Its trade is varied and growing, and (besides machine-shops, furniture, sash and door, basket and confectionery products) includes considerable industry in making marine engines, oval wood-dishes, shoes, floorings, interior finishings, wagons and sleighs. Settled early in the 50's, Traverse City was incorporated in 1895. Population, 14,500.

Trawl'ing, one of the many modes of catching fish, as cod, haddock, herring, soles, on the fishing-grounds off the American coast and in its bays and estuaries, as well as off the Newfoundland "banks" and off other countries of the world. In the Great Lakes of North America, as well as in deep-sea fishing, pound, gill and drift nets, seines and herring-weir, besides the hook and line, are used to trap fish, in addition to dredges, with fine-meshed nets, for obtaining oysters, scallops, clams, lobsters etc. The trawl in common use is a triangular net, purse-shaped, 60 or 70 feet in length, with a breadth at the mouth varying from 30 to 40 feet; this is fastened to a wooden beam, which keeps the net open, and is supported by two upright frames, called trawl-heads. The net, on its underside, has a deep, curved margin, attached to the ground-rope; the trawl itself having two deep pockets so adjusted that the fish, when caught, are unable to escape; while two long, stout ropes fasten the net to the trawl-heads, with a lengthy towing-line appended. The vessels engaged in trawling are generally visited periodically by swift-sailing cutters, which bring the fish, packed in ice, fresh to market. See TRAPPING.

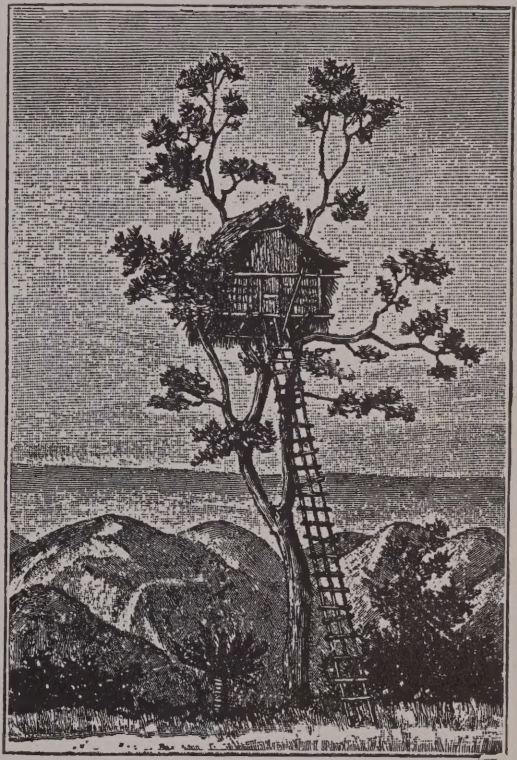
Treas'ury, Depart'ment of. See UNITED STATES, DEPARTMENTS OF THE.

Treaty of Ports'mouth, The, which closed the war of 1904–5 between Russia and Japan, was signed at Portsmouth, N. H., on Sept. 5, 1905, by the envoys of Japan and Russia; and on Oct. 14 by the Mikado and the Czar. President Roosevelt of the United States had urged peace on the belligerents as early as June 2, 1905. As a result, negotiations for peace were begun; and on June 10 Russia agreed to receive the proposals of Japan. Plenipotentiaries were appointed to meet at Washington, D. C., but Portsmouth, N. H., was chosen as the place of discussion. The principal articles of agreement were concluded between Aug. 8 and Aug. 31. It was agreed that Japan should have a protectorate over Korea, that Manchuria should be left to China, that Chinese territory should be safeguarded, that an "open-door" policy was to be maintained for the commerce of all nations with China and that the Liaotung peninsula should fall to Japan, with half of the island of Sakhalin. An armistice was concluded between Russia and Japan on Aug. 31; and on Oct. 16 the text of the treaty was published. Its terms were considered liberal to Russia, since she escaped an indemnity and gained railway concessions from China. See CHINA, JAPAN and RUSSIA.

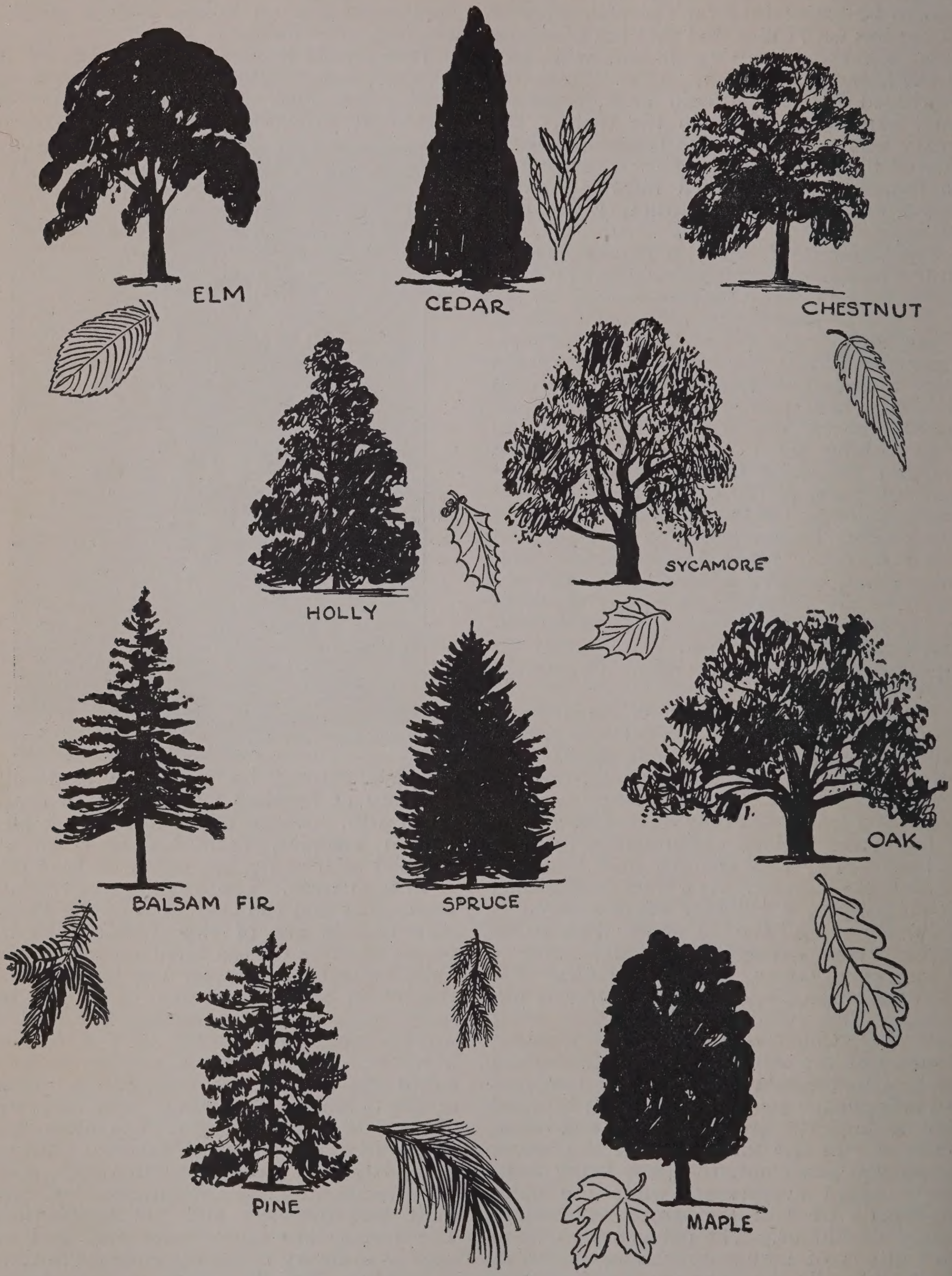
Trebizond (*trĕb′ĭ-zŏnd*), a Turkish seaport on the Black Sea. It is surrounded by hills, which take in many gardens as well as the town, and is defended by forts and a citadel. There are mosques and Greek churches, copper-foundries, dye-works etc. Its large trade with eastern Europe and Central Asia makes it, next to Smyrna, the chief commercial city in Asia Minor. Trebizond was a flourishing town when Xenophon and the Ten Thousand reached it on their retreat from Persia (B. C. 401-400). After it was conquered by the Romans, it rose in importance, Trajan giving it a larger and better harbor. When the crusaders took Constantinople in 1204, Alexius I of the imperial family founded the empire of Trebizond, till then a province of the Byzantine empire. It remained independent till captured by the Turks in 1461. Population 135,000.

Tree, the climax form of vegetation. There is no line of separation between shrubs and trees, but when a woody plant rises from the ground as a single shaft which is higher than a man, there is general consent to call it a tree. Not only do ordinary trees of temperate regions continuously increase in height, but their trunks and branches increase in diameter. As a rule, during each growing-season a cylinder of new wood is laid down around the old wood. In a cross-section these successive cylinders appear as concentric rings, and by counting the rings the approximate age of a tree is obtained. This habit of adding new wood each year, which increases the conducting capacity of the stem just so much, enables the tree to increase its display of branches and foliage each year. Such a habit is found only among the gymnosperms and dicotyledons. In the former group the leaves are mostly persistent, the trees being commonly called evergreens; while the dicotyledonous trees of temperate regions are mostly deciduous. The palms are common illustrations of monocotyledonous trees, in which there is no increase in diameter, hence no branching worthy the name and no annual increase of foliage display. The tallest trees, species of the Australian genus *Eucalyptus*, do not quite reach 500 feet. The largest trunks range in girth from 80 to 100 feet, and are developed by such forms as eucalyptus the sequoia, bald cypress and the baobab-trees of Senegal. A Mexican bald cypress is on record with a girth of 112 feet. See FOREST.

Tree-Dwell′ers are native tribes of the Australasian archipelago whose houses are built upon piles. They thus are elevated from four to eight feet above the ground, and are entered by a narrow ladder-like stairway of bamboo which may be drawn up at will. Where tribes fear attack from human enemies, their houses often are perched high in the air, either on long piles or in high trees. The dwellings of the wild Tagbannas and the Gaddanes of the Philippine Islands are of this type.. The Papuans of New Guinea have *dobbos*, houses built in high trees, their use being chiefly that of an acropolis in times of danger, but some tribes who are especially harassed by warlike neighbors appear to live entirely in them. In Sumatra a similar house is called the *balai*. The head-hunting tribes of the Solomon Islands are most deserving of the title of tree-dwellers. The inhabitants of the island of Ysabel, a favorite hunting-ground for the more northern tribes, make no attempt at armed resistance, but have built tree-dwellings and hill-fortifications. The former are quite numerous, and are used as ordinary places of residence in times of peace. Mr. W. Coote in *Wanderings South and East* describes such a house built



How the Clothes and Shapes of Trees Differ


ELM
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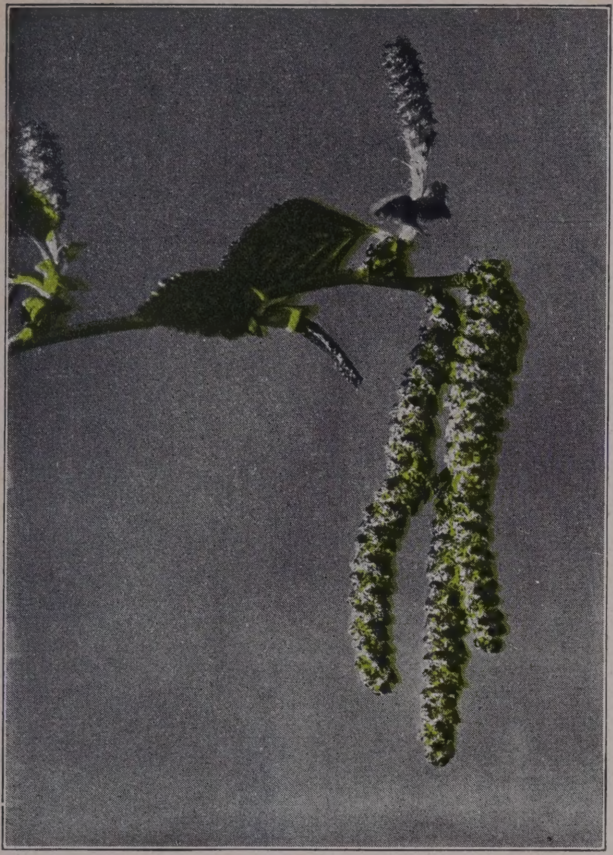
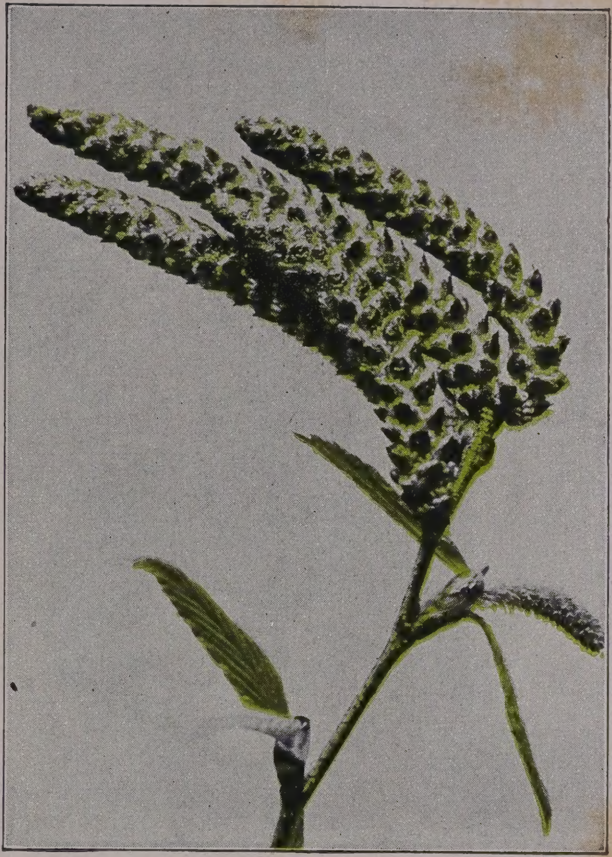
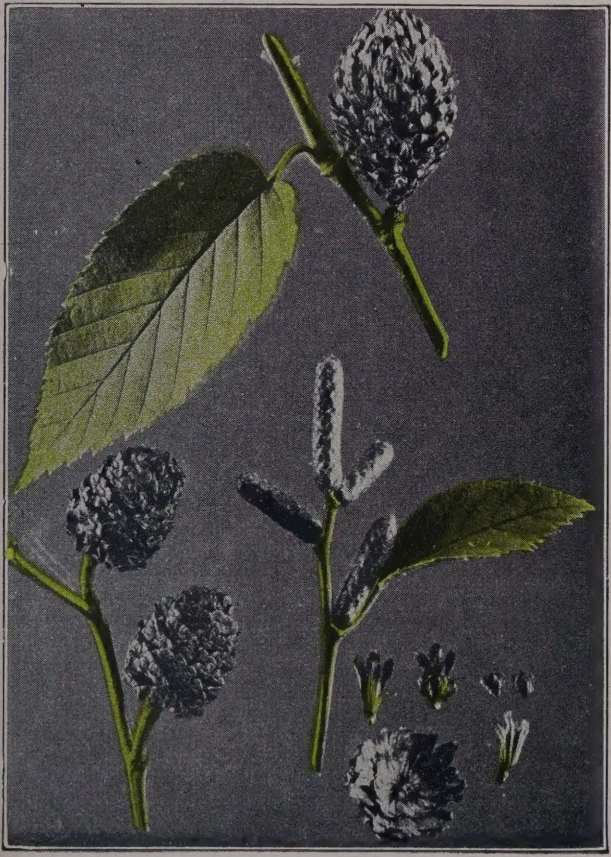
OAK
PINE
MAPLE



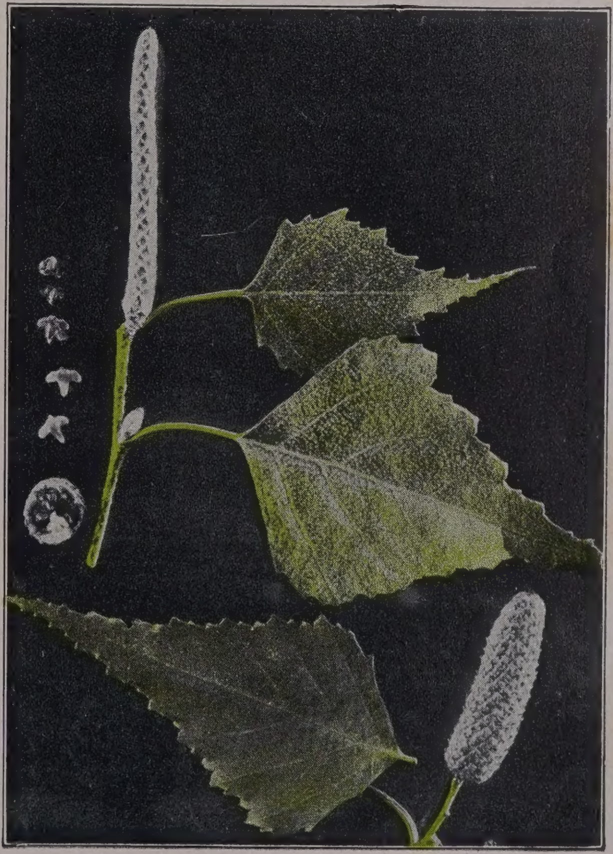
RED BIRCH.



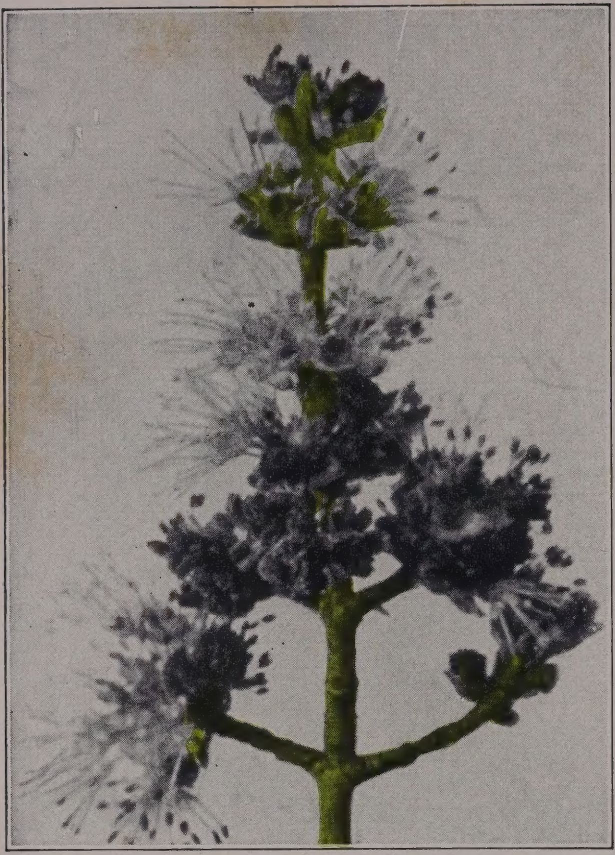
CHERRY BIRCH.



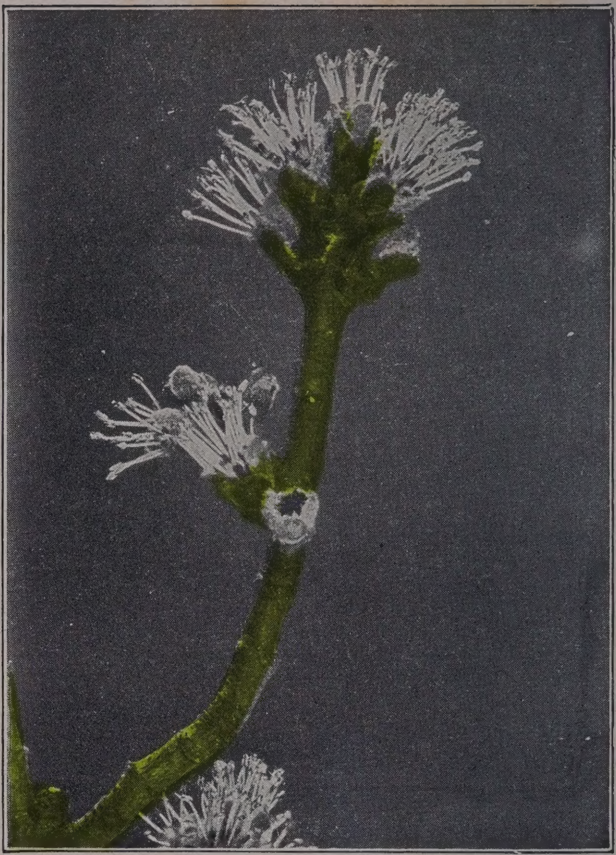
YELLOW BIRCH.



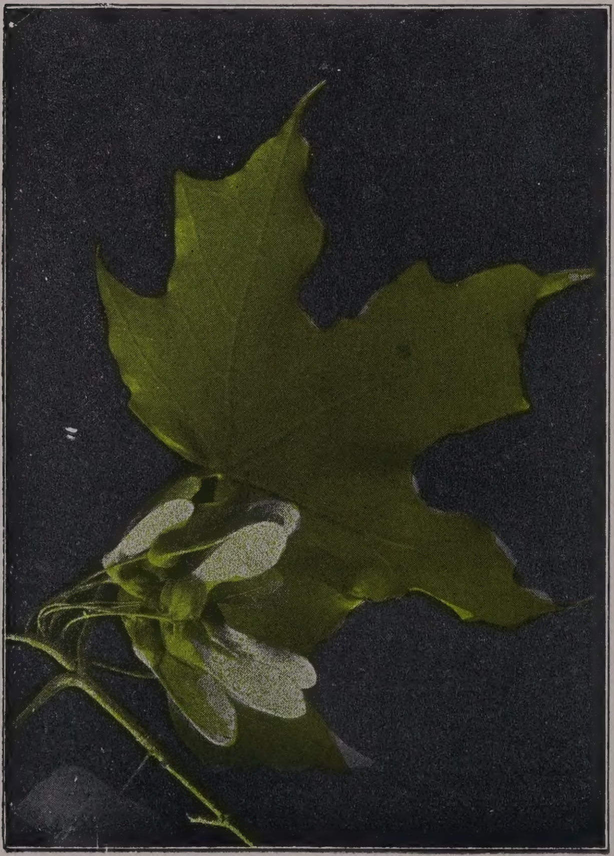
WHITE BIRCH.



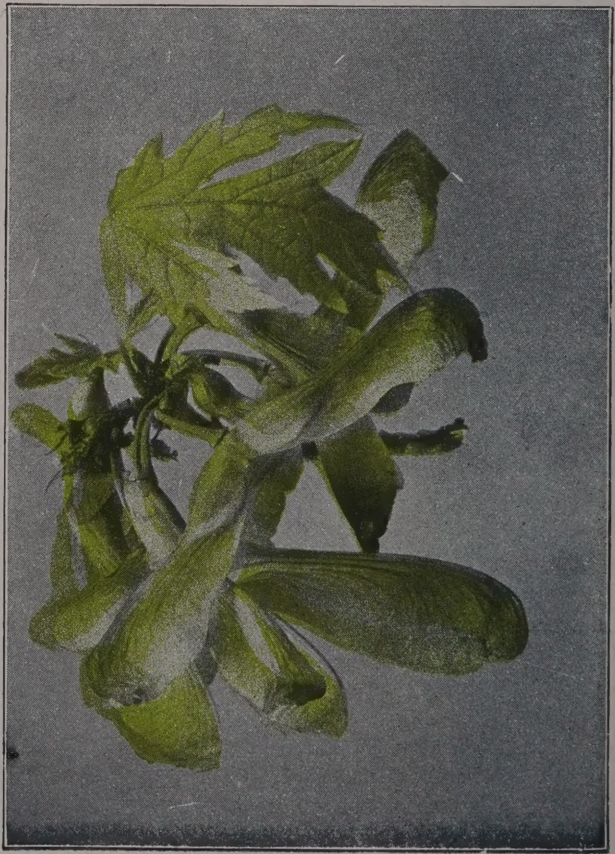
FLOWERS OF RED MAPLE.



SILVER MAPLE FLOWER.

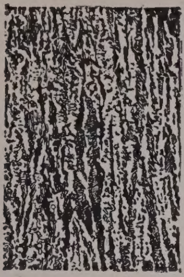


SUGAR MAPLE.

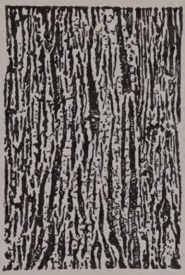


SILVER MAPLE.

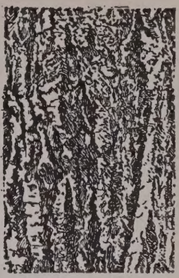
Can You tell the Trees by their Bark?



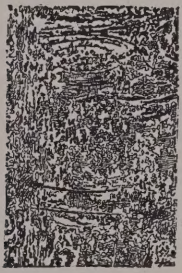
ELM



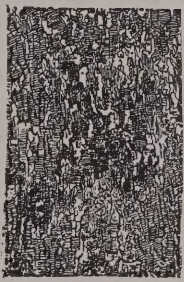
CEDAR



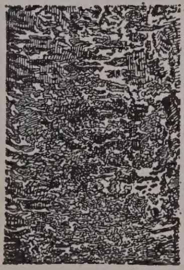
CHESTNUT



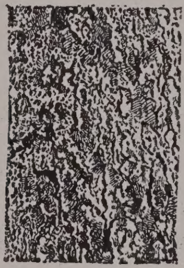
HOLLY



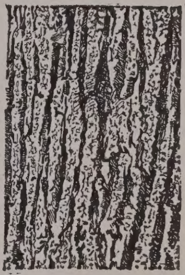
SYCAMORE



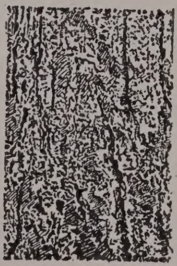
BALSAM FIR



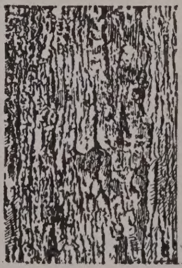
SPRUCE



OAK



PINE



MAPLE

in a large, hardwood tree. The lower branches had been removed; the house, which was 70 to 80 feet above the ground, was very commodious and substantial, being 26 by 18 feet, with a ridge-pole ten feet above the floor. The structure was firmly fastened. Ascent was made by means of a slender, rattan ladder, swung from the house to the ground A supply of stones was kept in the house to drive away the enemy if they should attempt to cut down the great tree.

Trench, Richard Chenevix, an Irish clergyman and writer, was born at Dublin, Sept. 9, 1807. He studied at Cambridge, and, after traveling a few years, became a country curate; then a theological professor in King's College, London; next, dean of Westminster; and, finally, archbishop of Dublin. His principal writings are *Notes on the Miracles*, *Notes on the Parables*, *Lessons in Proverbs*, *Synonyms of the New Testament*, *Deficiencies in our English Dictionaries* and *The Study of Words.* He helped (1870-81) to revise the King James' version of the New Testament. He died at London, March 28, 1886.

Tren'ton, N. J., capital of New Jersey and county-seat of Mercer County, on Delaware River, 33 miles from Philadelphia and 57 miles from New York City. It is served by the Delaware and Raritan Canal and Pennsylvania and Reading railways, and has trolley-connections with Philadelphia, New York and the principal cities of New Jersey and eastern Pennsylvania. It was settled in 1680, named in 1714 after William Trent who owned the site, and became the capital in 1790. Trenton was the scene of a battle, by some authorities considered the turning-point in the Revolutionary War, on Dec. 26th, 1776, when Washington crossed the Delaware, surprised the Hessians, and took over one thousand prisoners. The state-buildings include the capitol, asylum for the insane, reform-school for girls, prison, arsenal, armory, library and museum, normal-school and school for the deaf. Other prominent public buildings are the public library with 65,000 volumes, Federal court and postoffice, city-hall, court-house, 4 hospitals, 80 churches and 32 public schools. There also are 14 parochial schools, three business colleges, St. Francis College and a number of private schools. Among the most interesting historical buildings is the old French-and-Indian barracks, built in 1758. Battle Monument, 150 feet high, marks the position of the artillery under Col. Knox and Captain Alexander Hamilton at the opening of the Battle of Trenton. The leading industry is the manufacture of pottery. There are 42 potteries in the city. They manufacture all classes and grades of ware, from the commonest porcelain ware to the finest egg-shell china. More than half of all the pottery produced in the United States comes from the Trenton factories.

Besides the pottery works, the principal industrial plants are the iron-works and wire-mills of the J. A. Roebling Sons Co. (builders of the first bridge connecting Brooklyn and New York.) John A. Roebling, the founder of the company, was the engineer who designed the first important suspension-bridge in America, that over Niagara River. There are numerous other manufactories of iron and steel, structural iron, cables, chains, wire-cloth and netting, anvils, vises, iron and brass castings, engines and machinery. There are many brick and tile works, rubber-works, oil-cloth and linoleum factories, furniture-factories, spring-bed and mattress factories, woolen mills and cigar factories. The various industries employ about 25,000 men. Population 130,000.

Trian'gula'tion, a branch of surveying and geodesy, in which the positions of points on the earth's surface are determined by measuring with great accuracy a base-line and then constructing triangles on this. By measuring the angles and knowing the base line, the other distances become a matter of trigonometrical calculation. In connection with the survey of the United States being made by the coast and geodetic survey, a series of such triangles extending across the country has been fixed with great accuracy. The exact shape of the earth is determined from such triangulation in connection with astronomical observations of latitude and longitude.

Trib'unes, Roman, were popular magistrates elected annually from among the *plebs*, Romans not of noble birth, to safeguard popular interests. According to tradition the right of election of tribunes was wrested by the plebeians from the patricians in B. C. 494 by the device of a secession. The rights and powers of the tribunes gradually increased. From the first they had the right of protecting accused plebeians; and their persons were inviolable. Their principal acquired power was that of veto of a proposed law. The tribunes had by the time of the Gracchi become serious rivals of the consuls, the chief magistrates. Their number was increased to as many as ten; so that in politics any one of ten officials might obstruct legislation. As in the case of the Gracchi, the tribunician power was often over-ridden and was finally usurped by Octavian when he became emperor under the title of Augustus. In addition to these tribunes of the people there were officers in the Roman army with the title of tribune. The name in this sense originally meant an officer of the tribe; and may be traced back to the ancient tribal organization of the Roman army. There were six military tribunes in each legion, at first chosen by the consuls, but afterwards elected in the assembly of the tribes. Their powers were wholly military, not political.

Trichina (*trĭ-kī'nȧ*), a minute worm, parasitic in the muscles of swine and some other animals and very dangerous, since it can be transferred to man. The transformation comes by eating raw or imperfectly cooked pork. This worm (*Trichina spiralis*) was discovered in 1835 by Richard Owen. It is about one twenty-fifth of an inch long. When quiet, it lies coiled in a capsule or cyst within the muscles of the infected animal. When infected meat is eaten by man, the capsules are dissolved within the stomach and the worms set free. An immense number of new and very minute worms are soon produced — each female being able to supply 1,500 to 2,000 eggs. The newly hatched worms bore through the walls of the intestines and get into the blood-vessels and lymphatic passages, and are thus carried all over the body. They make their way from the blood-vessels into the muscles, and there become full-grown and inclosed in capsules. From that time they are quiet, and, if the patient can survive the period of migration, he recovers. The connection of this worm with the disease was made known about 1860 by Leuckart, Virchow and others. It is difficult to say how swine become infested, but the worm is found in the rat, and as these are about slaughter-houses and sometimes eaten by pigs, the infection may come in that way.

Trichogyne (*trĭk'ō-jĭn*), (in plants), a tubular, hair-like process developed from the female organ (*carpogonium*) of the red seaweeds. See RHODOPHYCEÆ.

Trichome (*trĭk'ōm*), (in plants), a general term applied to outgrowths from the epidermis, chief among which are hairs. See HAIR.

Trieste (*trē-ĕs'tȧ*), a seaport of Austria (*q. v.*), at the head of the Gulf of Trieste, on the Adriatic Sea, 90 miles northeast of Venice. There is an old town, with narrow streets and black walls, built on the slope of a hill and surmounted by a castle. Its cathedral has stones with Roman inscriptions built into its walls and a tower resting, it is said, on the foundation of a temple of Jupiter. The new town, on the plain toward the sea, is a handsome city with a fine harbor. There are extensive manufactures for making soap, rope, white lead, wax and leather. The people are Germans, Italians, Greeks, Jews and Dalmatians, but the majority speak Italian. Trieste, as Tergeste or Tergestum, was plundered by neighboring tribes as early as 51 B. C. In 1382 it passed into the hands of Austria. Population 229,475.

Tri'lobite, among fossils, any individual of the order *Trilobita*, so called from the division of the external skeleton into three regions. These comprise a cephalic shield or head; a variable number of body-rings; and a caudal shield or tail. They vary greatly in size, some being scarcely larger than a pin's head, while species of *Asaphus* have been met with that are two feet in length. They appear to have lived in shallow water, feeding on small marine animals. They are found in large numbers in the paleozoic system of rocks.

Trinidad (*trĭn'ĭ-dăd'*), the most southern of the West Indies, lies off the coast of Venezuela, nearly opposite the mouth of the Orinoco. It is 50 miles long and from 30 to 60 wide, and includes 1,754 square miles. The two channels to the harbor are called the Dragon's Mouth and the Serpent's Mouth. On the northern coast are forest-covered mountains, one with two peaks, called Tamana, while the rest of the island abounds in fertile valleys and plains. There are some good-sized rivers and several fine harbors. A lake, with pitch floating on its surface, is one of the curiosities of the island. (See ASPHALT.) The most important products are cocoa, sugar, rum, molasses, coffee, cotton, cocoanuts and oil. There are 250 public schools, with 40,956 pupils, many private schools, Queen's Royal College and a Roman Catholic College, with a total of 427 students. The chief town, Port of Spain, originally built of wood, was burned in 1808. The new town, built of stone, is one of the finest in the West Indies. The island was discovered by Columbus in 1498 and named Trinidad, because he first saw three mountain-summits from his ship. In 1797 it was taken by the British from the Spanish, and in 1889 Tobago was annexed. It has 81 miles of railway and 1,147 of telegraph and telephone. There are steamship lines to England, Holland, North America and Venezula. Population 330,074.

Trinidad, Colo., a city, the seat of Las Animas County, in the eastern foot-hills of the Rocky Mountains, on Las Animas River, and on the Denver and Rio Grande; Atchison, Topeka and Santa Fé; and Colorado and Southern railways, 85 miles south-southeast of Pueblo. In the vicinity there is a good farming and cattle-raising country, and it is rich in coal, and produces much livestock, alfalfa, beans etc. It has good municipal buildings, churches and schools, a public library, an hospital, an academy and an attractive park. Besides its coal-mines, railway-shops, foundry and ice-plant, it has a wool-scouring mill, a cigar-factory, a brick-yard and bottling works. Population, 14,750.

Trinity College, Toronto, Can., was founded by Bishop Strachan to secure for the youth of the church the best secular education in the arts and sciences combined with the religious teaching of the Church of England. By the generosity of churchmen in Canada and in England a liberal endowment was raised and a building erected in 1851. The college was formally opened in 1854. St. Hilda's College (for women) was established later and affiliated with it. In 1903 Trinity became a part of the University of Toronto along with Trinity Medical College, Ontario Medical College for Women and Toronto Conservatory of Music. The buildings of Trinity College (Tudor front, carved stone ornamentation) are beautifully located in a park of 35 acres. Trinity's contribution during half a century to the cause of education in Ontario is inestimable.

Triple Entente. For many years previous to the outbreak of the Great War of 1914, Great Britain and France had drawn closer together owing to the growth of the power of Germany and their interest in the preservation of "the balance of power." Largely through the influence of Edward VII they reached the agreement known as the Entente Cordiale, or "Cordial Understanding." Its terms, made known in Parliament in 1911, provided for British aid to France in case of an attack by Germany; and was an important factor in the international crisis over Morocco (*q. v.*), when England came to the support of France. Three years after the establishment of this understanding Great Britain and Russia—who had long been at odds over their respective spheres of influence in Persia (*q. v.*) and the Near East—also made a treaty, with the result that the Dual Alliance between France and Russia expanded into what was known as the "Triple Entente."

Tripoli (*trip'o-li*), one of the Barbary states of North Africa, between the desert and the Mediterranean, with Benghazi covers 398,900 square miles. The Atlas Mountains, which end here, run parallel to the coast and are lower than in the other Barbary states, being not more than 4,000 feet high. There are no rivers and very little rainfall, and vegetation must depend on the heavy dews. In the coastal regions, which are very fertile, cotton, grain and tropical fruits grow, while in the interior senna, dates and carrots are grown and the lotus flourishes. Sheep and cattle are raised in large numbers, and the horses and mules are celebrated. The trade, once considerable, has declined since new routes through Central Africa have been opened. Tripoli belonged to the Carthaginians, was taken from them by the Romans; then passed into the hands of the Arabs. It was taken by the Turks in 1552, and from them by Italy in 1911. Population estimated at about 600,000.

Trip'oli, a city of Africa and capital of the Turkish province of Tripoli, is on a point of rocky land projecting into the Mediterranean. It is the principal seaport, and is built with high walls and bastions, mosques, synagogues and Christian churches. It has some important manufactures as leather, carpets and scarfs. It is the starting-point for caravans for the Sudan, which give it a large trade, though somewhat decreasing of late years. The people are nearly all Mohammedan, but business mostly is in the hands of the Jews and Christians. Population 35,000.

Tri'reme, the name given anciently to a galley or vessel with three banks of oars. The oars were arranged in banks or rows, one above the other. The oars of the lowest rank were the shortest, and the rowers had the easiest work and the least pay. There was a small sail also that could be used with a good wind. The crew consisted of 200 men, and often they moved the vessel as swiftly as a modern steamboat. The crew was usually composed of convicts and of slaves, taken in war, and could hope for no release save that of death. The triremes were used in the Persian and Peloponnesian wars, but later the galleys were made with five banks of oars and called quinqueremes. See GALLEY.

Tris'tan and Isolde'. A music-drama in three acts; words and music by Richard Wagner Completed in 1859, and first performed in Munich in 1865 under the direction of Hans von Bülow (1830–94). The work was written during 1857–9 — a period in which Wagner was also engaged on *The Ring of the Niebelungen.* Wagner entitled this opera *Eine Handlung* (an action). He uses the Celtic legend of Tristam and Iseult, with modifications to suit his purpose. The dying song of Isolde, with which the work closes, has been effectively arranged as an instrumental number for the concert-room.

Triumvirate (*trī-ŭm'vĭ-rāt*), the name of an office among the Romans, filled by three persons. There were triumvirates for the regulation of public affairs, mentioned near the end of the republic. The government under Cæsar, Pompey and Crassus in 60 B. C. is called the first triumvirate, but the title was never formally given to them. The first triumvirate was that of Octavian, Antony and Lepidus in 43 B. C., though usually called the second. They held office for ten years. One set of triumvirs in Rome had charge of the night-police and another of the prisons.

Trol'ley-Cars are street-cars propelled by electricity by means of a trolley, a pulley working upon a wire overhead. The name, therefore, is appropriate only to electric tramways in which a rod is used to establish a connection between the motor of the car and the wire overhead. In America, however, the name is freely applied to other forms of street-car. Steam and horses have both been well-nigh discarded from street railways; even the cable-car has had its day; and the trolley-car properly so called, or the electric tramway, now reigns supreme. In 1890 there were 500 miles of cable-car lines in the United States, 6,000 of horse-car and 2,000 of electric tramways; but in 1908 the mileage of electric tramways had increased to 41,244 miles. Of the electric trolleys, the most rapid and convenient are the underground-car systems in use in such cities as New York, London and Boston. In an overhead-trolley the current passes along the wire overhead, down through the rod to the motor, thence to the rails and so back to the central station. In America the posts for the overhead wires usually are plain and occasionally unsightly; in Europe usually ornamental and expensive. To avoid the cumbrous overhead construction, some trolley lines are constructed on the conduit-system. This is expensive, because it is necessary to construct a complicated conduit between or at the side of the rails, having a groove opening to the street, so that the so-called plow may connect the conductors in the conduit with the motor.

The storage battery was at one time used on a number of street-car lines, but the weight of the battery and its rapid deterioration under traffic conditions were disadvantages and it is not now used. See ELECTRIC MOTOR and ELECTRIC RAILWAY. The articles on Electricity and Dynamo—Electric Machine can also be consulted with profit in this connection.

Trollope (*trŏl′lŭp*), **Anthony,** an English novelist, was born at London on April 24, 1815. He spent 33 years in the British postal service, and visited the United States, Austria and the West Indies in its interests. He invented the postal pillar-box. Some of his stories appeared first in *St. Paul's Magazine*, of which he was editor. His novels include *Orley Farm, The Bertrams, The Small House at Allington, Barchester Towers, The Last Chronicle of Barset* and many others, as he was a most prolific writer. He also wrote a *Life of Cicero*, a *Life of Thackeray* and works on *North America* and *South Africa*. His works number 70. He died on Dec. 6, 1882. Consult his *Autobiography*.

Trom′bone, a musical instrument, a form of the trumpet. The name is from the Italian, and means a great trumpet. It is a brass wind-instrument, so made in two parts that, by sliding one part into the other or drawing it out, the tube through which the air passes can be lengthened or shortened and the depth and power of the tone changed. Three kinds of trombones are used, called alto, tenor and bass trombones, according to the pitch. The tone of the trombone is grander and more powerful than that of the trumpet, making it a very effective instrument in an orchestra.

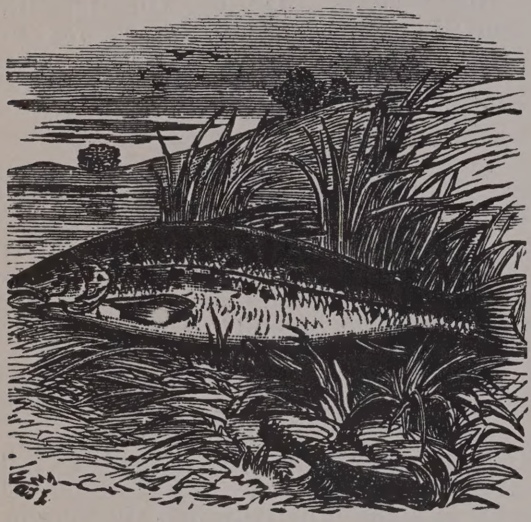
Tromp, Martin Harpertzoon van, a Dutch admiral, was born at Briel, Holland, in 1597. He was captured at sea, when a boy, in a fight on the coast of Guinea, in which his father, a Dutch commander, was killed. He served as cabin-boy for his captors for more than two years. In 1624 he was in command of a frigate, and in 1637 was at the head of a squadron of 11 ships. His first victories were over the Spanish fleet, taking 13 ships in one battle, Oct. 21, 1639. In November, 1652, he encountered the English fleet under Admiral Blake in the Straits of Dover, and drove them before him, sailing up the Channel with a broom at his masthead, to denote that he had swept his enemies from the seas. He was defeated by the English in February, 1653, after a terrible three days' fight; and again in June of the same year, when he lost 17 vessels. On Aug. 10 the struggle between the Dutch and English was renewed, the Dutch losing 30 men-of-war and Tromp himself. He was buried at Delft.

Trop′ic=Bird, the name for three species of sea-birds commonly seen in the tropics far from shore. During the breeding-season they frequent rocky shores and cliffs, but build no nests. The more common variety, sometimes seen on the coast of Florida, is about the size of a partridge. It has white plumage with fine black markings above and black bands on its wings. These birds have the two central tail-feathers greatly prolonged, and, therefore, are called marlinspike by the sailors; and because of their loud, shrill cry, the sailors also name them bo's'n-bird. The young do not in the least resemble the adults, but look like balls of white down. From the tail of the roseate tropic-bird the Pacific islanders procure the highly-prized red feathers worn by warriors in battle.

Trop′ics, the two lines of latitude parallel to the equator, drawn, one through the winter, and the other through the summer, solstice. They are equally distant from the equator, being about 23° 28′ north and south of it, and include between them all those points of the earth's surface where the sun always is vertical or directly overhead. The northern line is called the Tropic of Cancer, because the sun, which is directly over this tropic at the summer solstice, then enters the constellation of Cancer; the southern line is called the Tropic of Capricorn, because the sun, when vertically over it, enters the constellation of Capricorn. The country between the two tropics is called the torrid or hot zone, and the temperature is known as tropical. The word tropic comes from a Greek word meaning a turning, and indicates that the sun turns back at these lines.

Troubadour (*trōō′ bȧ-dōōr′*), in southern France, Spain and Italy a class of poets distinguished from minstrels and strolling musicians by the fact that they indulged in verse-making for the love of it, and not for money. In northern France they were called *trouvéres*. They were often attached to the courts, and were attended by minstrels or *jongleurs*, who accompanied them on musical instruments, as it was usually considered beneath the dignity of a troubadour to be his own fiddler. The troubadours' poetry consisted mostly of love-songs, though they sometimes touched upon the wars of the period or ventured to upbraid the evil customs of the times. At court-festivals there often were several troubadours, who engaged in verse-contests on subjects suggested by the ladies of the court. They flourished about from 1090 to 1290. Among the best-known troubadours were Richard the Lion-heart, Pierre D'Auvergne and Pierre Vidal, while the counts of Provence and of Toulouse, the kings of Aragon and of Castile, King Richard and Eleanor, queen of Henry II, are among their most illustrious patrons.

Trout, the name for a number of fresh-water fishes belonging to the same family as the salmon. The latter also is usually embraced under the name trout. They live in cold, clear streams and lakes, and are among our best food-fishes. They naturally are inhabitants of the northern hemisphere, but have been introduced into New Zealand and Australia. The common river and lake trout of Europe are black-spotted varieties, and reach a larger size than the American river-trout. Two kinds found in the United States are worthy of especial mention, the lake-trout and the brook-trout. The former is also called Mackinaw trout. It inhabits the Great Lakes and other lakes from New Brunswick to Montana and north to British Columbia and Alaska. It reaches a length of three feet or more. The brook-trout, which really is a charr, with its minute scales and beautiful red spots, is one of the most exquisite fish in appearance to be found anywhere, and it is unsurpassed as a food-fish. It ranges from Maine to Dakota, always in cold streams. Its length is from five to twenty inches, and it reaches an extreme weight of twelve pounds. In the Rangeley Lakes of Maine specimens have been caught and weighed that exceeded even twelve pounds. The trout west of the Rocky Mountains embrace the only black-spotted trout native to the country. Some of them live in warmer streams than their eastern relatives. The rainbow-trout is black-spotted and approaches nearly to the European river-trout. The latter, with some other forms, have been introduced into the waters of the United States.


TROUT

Trow'bridge, John Townsend, American novelist, poet and editor, was born at Ogden, N. Y., Sept. 18, 1827, and was partly educated at a classical school at Lockport, N. Y. Early in life he lived on a farm and occasionally taught school, and in 1847 he went to New York and began to write for the press. He removed to Boston, contributed to magazines and journals, and took actively to authorship. His chief works are *Cudjo's Cave*, *The South and Its Battlefields*, the *Jack Hazard* series, *The Drummer-Boy*, *The Tide-Mill* series, the *Toby Trafford* series and the *Start in Life* series. He has also published *The Vagabonds; The Book of Gold; The Emigrant's Story;* and *My Own Story*. He died in 1916.

Troy, a famous city of Asia Minor, the seat of the Trojan War, which forms the subject of Homer's great *Iliad*. It was situated, according to the poem, at the foot of Mt. Ida, in the northwestern part of Asia Minor, with a plain in front stretching for nine miles, called the Plain of Troy. The city was also called Ilium. Paris, the son of King Priam of Troy, carried off Helen, the wife of King Menelaus, king of Sparta, and the most beautiful woman of her age. The Greeks, after spending ten years in collecting a fleet of 1,186 ships and an army of 100,000 men led by Agamemnon, drove the Trojans into their city, and after a siege of ten years the city was destroyed. In the tenth year of the siege occurred the quarrel between Agamemnon and Achilles which is the subject of Homer. It so weakened the Greeks that they were driven back to the sea. Vergil in *The Æneid* tells the story of the wooden horse filled with warriors, left before the walls of Troy by the apparently retiring Greek army, which was drawn into the city. The warriors, thus introduced, opened the gates to the returning army, and Troy was taken by stratagem. After the fall of Troy a new city sprang up, called New Ilium, which occupied the site of Hissarlik, about four miles from the mouth of the River Mendereh, now believed to be the Scamander of *The Iliad*. This spot has been excavated by Dr. Schliemann, and the remains of a great city found, thought to be those of ancient Troy. See ACHILLES, ÆNEAS, AGAMEMNON, HELEN, HOMER, ILIAD, ILIUM, MENELAUS, ODYSSEY, SCHLIEMANN and ULYSSES. Consult Schliemann's *Troy and Its Remains*.

Troy, N. Y., county-seat of Rensselaer County, on Hudson River, six miles north of Albany, is at the head of steamboat navigation. There is a large dam across the Hudson, which, with two small streams falling 200 feet from hills back of the city, furnishes a large water-power. It is connected with Lakes Champlain, Ontario and Erie by canals. Among its public buildings are the city-hall, orphan asylums, Earl crematory, an athenæum and the union-station, one of the finest in the country. The city annually expends $144,220 on its public schools, which have 211 teachers and 6,357 pupils. Troy Female Seminary, established in 1821, was one of the first institutions of the kind in the country, and is still successfully maintained. Rensselaer Polytechnic Institute and St. Joseph's Theological Seminary are among its schools. The principal manufactures are of iron, its factories and furnaces being the largest in the eastern part of the Union. It manufactures bar-iron, railway-spikes, nails, screws, bolts, stoves, furnaces, hollow ware and machinery. It has the largest factory of mathematical instruments in the country, and the shirt and collar factories are very extensive. The old Vanderheyden house, built in 1752, was the first house on the site of Troy, and the place was known as Vanderheyden's Ferry and as Ferryhook until 1789, when it was named Troy. It has been almost destroyed by fire three times. Population 76,813.

Truf'fles, the common name of certain edible fungi, belonging chiefly to the genus *Tuber*. Nearly all are subterranean and appear as tuber-like bodies developed on a mycelium. Truffles are among the most prized of the edible fungi, and are chiefly cultivated in Europe. See ÆCIDIOMYCETES.

Trum'bull, John, an American painter, was born at Lebanon, Conn., June 6, 1756. He graduated at Harvard College, and studied his art at Boston. He served in the army during the Revolutionary War as adjutant of the first Connecticut regiment, aide-de-camp to Washington, major and colonel, resigning in 1777. While studying painting in London in 1780, he was imprisoned for eight months during the excitement produced by the execution of André. His first American historical pictures were *Battle of Bunker Hill* and the *Death of Montgomery*. He painted portraits of Washington and other Revolutionary characters. In 1817 he was employed by Congress to paint four pictures for the rotunda of the capitol, and as subjects chose *The Declaration of Independence*, *Surrender of Burgoyne*, *Surrender of Cornwallis* and *Resignation of Washington*. His historical paintings, numbering 57, were given by him to Yale College, and are valuable as collections of portraits of the prominent actors of the period. He died at New York, Nov. 10, 1843. See *Autobiography*.

Trumbull, Jonathan, an American statesman, was born at Lebanon, Conn., Oct. 12, 1710. A graduate of Harvard College and a theological student, he was turned aside into business by the death of his elder brother. He became a member of the general assembly of Connecticut in 1733, speaker in 1739 and assistant in 1740, being re-elected 22 times. He was chief judge of the superior court for three years and governor of the colony for 14. He was prominent in the opposition to England before the Revolutionary War, refusing to take the oath to support the Stamp-Act, and his advice was sought by Washington, who looked upon him as one "of his main pillars of support." The name of Brother Jonathan, given to the United States, is attributed to Washington's frequent remark, alluding to Trumbull: "Let us hear what Brother Jonathan says." He died at Lebanon, Conn., Aug. 17, 1785. See *Life* by Stuart.

Trumbull, Lyman, American jurist and senator, was born at Colchester, Conn., Oct. 12, 1813, and died at Chicago, June 25, 1896. He studied law in Georgia, was admitted to the bar, and settled in Belleville, Ill., where he was elected to the state legislature, became secretary of state, and in 1848 was elevated to the bench of the Illinois supreme court. In 1854 he was elected to Congress, and in the following year became a member of the United States senate. During and after the Civil War he was a prominent Republican, acting earnestly with that party, favoring the abolition of slavery, but opposing the impeachment of President Johnson. He subsequently supported the Democratic party, and in 1880 was Democratic candidate for the governorship of Illinois.

Trump'et, a musical wind-instrument, of great antiquity. In its modern form it is a tube eight feet long, having a bell-shaped end and doubled in a long curve, about three feet long, and is played from a mouthpiece. It has a range of over two octaves. It has been used in war, and is a common instrument in military bands.

THE EAR-TRUMPET is an instrument which collects the waves of sound and carries them to the ear, thus enabling a deaf person to hear better. The small end is placed at the ear and the large end is open to the air or placed at the mouth of the person speaking.

THE SPEAKING-TRUMPET is a straight tube with a mouthpiece, which collects the sound-waves, so that the voice of a person speaking into it is louder, and the sound is carried farther.

Trumpet-Flower, a popular name for a vine with a woody stem and clusters of scarlet flowers shaped like a trumpet It grows to a great height and very rapidly, and is found in the central and southern states of the Union, where it is often called trumpet-creeper. Other varieties from China. Japan, Australia and South

America are cultivated in gardens and greenhouses.

Trusts. In the United States this term has come to mean a form of commercial association between individuals or corporations engaged in producing the same commodity, for the general purposes of regulating the amount of production; of establishing a uniform price; of diminishing the cost of competition; and of controlling the markets, in part at least upon the principle of monopoly. Such an organization is managed by a board of trustees to whom all the corporation stock of the constituent companies is irrevocably assigned.

There are several methods of organizing a trust. Each of the combining parties may lease his concern to one central body; or one central corporation purchases as fast as they are manufactured all products of the various parties, and then a fixed price is placed on the aggregate production of each party, and trustees are elected who control the sale of the whole product and divide the products proportionally among the various companies. The more usual plan of operation is as follows: All parties entering the organization become incorporated; then the stock of all the corporations is handed over to trustees who in exchange for stock thus deposited issue trust-certificates. They also elect directors who have complete control of the affairs of the concerns associated in the trust. Trust-certificates are transferable; dividends are issued according to the proportion of certificates held by each party. Trustees are elected annually by the holders of certificates, and through the directors they possess almost unlimited power over individual concerns. They may cause one concern to stop producing altogether, may limit productions, fix prices and the amount and manner of sales; in short, they control the entire field.

To illustrate: A few years ago 16 of the large sugar-refineries in the United States, furnishing the greater part of the sugar consumed, joined in a trust with a capital of 50 million dollars. As soon as the combination was effected, five of the factories shut down. At once the margin between raw and refined sugar began to widen. To the producer of raw material they dictated the price, for there was but one buyer, and to the consumer they dictated prices, for there was but one seller. Such forms of trusts have been declared illegal in the courts of every state where the matter has been contended.

The first important trade-combination of this sort formed was that of the Standard Oil Trust in 1881. It was quickly followed by the Cottonseed-Oil, Sugar, Tobacco and Lead Trusts etc.; and by the census of 1900 there were 185 such combinations of formerly independent concerns.

Trusts are the outgrowths of the ruinous competitive system, due to ease of intercourse and the difficulty of readily withdrawing capital once invested in fixed plants. They save salesmen's salaries, competitive advertising, cross-freights, running plants part time etc. They permit the standardizing of machinery and the organization of workmen under competent leadership. The large profits made by financiers and promoters, sometimes assisted by governmental favors, have encouraged their rapid multiplication in number and size. The tariff, by lessening foreign competition, is given as an indirect cause of the formation of trusts as is also monopoly granted by patents, copyrights and trademarks.

The U. S. Circuit Court for New Jersey in a suit brought by the government to dissolve the United States Steel Corporation under the Sherman Law held, June 3, 1915, that it was not a combination in restraint of trade; that the mere size of the organization and the volume of its business was no offense and that the company's policies, except in its attempts to regulate prices by agreement with competitors—a practice discontinued before the suit was brought—had not produced unfair or dangerous consequences. Many of the direct competitors of the corporation and several of its customers testified in its behalf as having been the chief instrument in maintaining fair competition and helping to secure fair and stable prices, a condition so important in the iron industry.

Many trusts are founded upon a natural monopoly: that is, they control the supply of raw material and by the extension of this control they put competitors at a great disadvantage, especially when, as in the case of oil, coal and iron, these raw materials are found in limited fields and quantities. A trust may become a monopoly to the degree in which it governs the supply of raw material for the industry which it seeks to control.

Recent antitrust movements have brought to light a number of evils peculiar to corporate finance; chief among them are wildcat promotions, payment of unearned dividends, speculative management and over-capitalization. By wildcat promotion is meant the action of the promoter who issues stock far beyond the actual cash-value of the plants under consideration. He pays for the plants with whatever stock is necessary, and retains the remainder, often securing for himself 20% of the capital of the organization paid to him in common stock Besides this, the man who finances the company sometimes receives a premium of 50 per cent. for his risk. The capital stock usually is both preferred and common, the preferred representing the properties, including cash and cash-assets, which receive a fixed dividend of six or seven per cent, but do not participate in any way in earnings in excess of the fixed percentage. In case the earnings are below this rate, the "unearned dividends" must still be paid at the expense of the common stock. The common stock represents expected earning-capacity, on which the income fluctuates with the success of the enterprise.

The effect upon prices has been a subject of much discussion. It is commonly said that trusts inevitably drive all small concerns to the wall and build up a few large establishments on their ruins, and also that monopolies' price, wherever possible, is far above the price level of competition. In discussing this question we may assume that competitive prices are fixed mainly by the cost of producing that part of the output which is produced at the greatest disadvantage, and also that monopoly price is fixed at that point which will secure for the monopolist the greatest net return. While the ultimate effect upon prices cannot yet be determined, many instances show that in individual cases, for short periods of time, the trusts have actually lowered prices below the former competitive rates. Likewise numerous instances can be found of prices raised above such former rates, usually after the markets have been secured. The Industrial Commission has shown that the influence of the trusts has increased the margin between the cost of raw material and the finished product.

Owing to popular dissatisfaction and alarm at the abuse of power by some of the trusts the Sherman Anti-Trust Law was passed in 1890, following that establishing the Inter-state Commerce Commission (*q. v.*) in 1887. Both measures were aimed at what was regarded as unfair business methods; but as it was found difficult to interpret and apply the Sherman Law in any given case in advance of costly lawsuits, and because it was asserted the abuse of power by the trusts had been but little affected, further legislation was demanded. The result was the passage in 1914 of the Clayton Bill as a check upon the trusts, and the bill establishing the Federal Trade Commission to better enforce the laws for the regulation of trusts.

The Clayton Law forbids interlocking directorates; discrimination in price, where such discrimination tends to create monopoly; agreements fixing price; contracts shutting out the goods of a competitor, ownership of stock by one corporation in another where such ownership lessens competition. No person can be an officer or employe in more than one bank or trust company. (This does not apply to the inter-organization of banks in the Federal Banking System, v. p. 488). Laborers and agriculturists are permitted to organize "for mutual help;" for the purpose of marketing products to the best advantage, maintaining quality and—in the case of labor organizations (*q. v.*)—collective bargaining for wages.

Tsad or **Tchad** (*chăd*), a lake in central Africa, about 150 miles long and 120 wide. Two large rivers flow into it, but it seems to have no outlet, though there are signs of an ancient river-bed, bordered by trees, in which the Arabs say water flowed for 100 miles during a flood in 1870. There are populous villages on the shores, and the many islands in the lake are densely peopled by pagan tribes, dark brown or black, with regular features, wearing cotton-garments and cultivating cotton and corn.

Tschaikowsky (*chī-kôf′skē*), **Peter Ilitch,** a distinguished Russian composer, was born at Votkinsk in the province of Vyatka, April 25, 1840, and died at St. Petersburg, Nov. 7, 1893. Early in life he held a government-post in the Russian service, but this he abandoned in 1862 to study music in the conservatory of music at St. Petersburg, where he was instructed in harmony and counterpoint by Zaremba and in composition by Rubinstein. After graduating, he for a number of years was professor at the conservatory of music at Moscow, where he composed many melodies gathered from the airs of the folksongs of his native country and characterized by weird and plaintive music. Among his compositions are overtures, symphonies, concertos, marches and operas, many of which are of great sweetness and beauty. In 1889-90 he visited London, appearing there at Philharmonic concerts, and in 1891 he came to New York City at the invitation of the New York Symphony Society, where he gave renderings at Carnegie Music Hall of many of his own compositions.

Tset′se a two-winged insect slightly larger than the common fly, inhabiting portions of South Africa. Its bite usually is fatal to the ox, horse and dog, but harmless to man, the goat and wild animals living in that region. It lives by sucking blood, but its bite is not immediately fatal, the bitten animals sometimes lingering for weeks and months. It is so local in its distribution, that it is sometimes seen in swarms on one side of a river while cattle are grazing undisturbed on the other.

Tu′ber, a form of underground stem, which is much thickened by food-storage, as the common potato. It usually shows its nature as a stem by bearing minute leaves (scales) or buds, as the "eyes" of the potato. Tuber also is the name of the genus of fungi to which the truffles belong.

Tube′rose′, a plant which belongs to the same family as the amaryllis, having a bulbous root; long, slender leaves; and a cluster of very fragrant, white, wax-like flowers, growing at the end of a stalk two or three feet long. The bulbs were brought at first from Holland and Italy, but now are raised in the United States, those grown in Georgia and Florida being larger than the imported ones. It is a tropical plant, probably a native of the East Indies or Mexico.

Tü'bingen, See UNIVERSITY.

Tuck'er, John Randolph, American lawyer and statesman, son of Henry St. George Tucker, was born at Winchester, Va., Dec. 24, 1823, and died at Lexington, Va., Feb. 13, 1897. He was educated at the University of Virginia, studied law, and was admitted to the bar in 1845, and from 1857 to 1863 was attorney-general for his native state. The Civil War dispossessed him of this post, but he was appointed to the chair of equity and public law in Washington and Lee University and held that office four years (1870–4). From 1874 to 1887 he was a member of Congress, and acted frequently as chairman of the judiciary committee and of the committee on ways and means, and took an active part in the Congressional debates on the tariff. His oratory was frequently listened to in the house on many other important topics and themes of legislative import.

Tucson (*tū sŏn'*), **Ariz.** This city was founded by white settlers four hundred years before the railways came. Your grandfather's geography stated that it was a far western trading post sixty miles north of Mexico in the valley of the Santa Cruz, 2,520 feet above sea-level, a cattle center, and a walled city recently acquired by the United States by the Gadsen purchase, which bought southern Arizona from Mexico in 1854. Your geography should state that the city is the center of a large copper industry, a principal city between El Paso and Los Angeles, with 40,000 inhabitants, that it is the home of the University of Arizona and is famed for its delightful winter climate and its 300 days of sunshine yearly. Sixty years ago Tucson (the old pueblo or city) was typically Spanish and Mexican, with narrow streets and adobe houses. Later it became a wild-west town. To-day it is an up-to-date American city, with a pleasing dash of old Spanish flavor. The site was visited by Coronado and his conquisitors in 1540—only 48 years after Columbus discovered the continent. About 1687 Padre Kino, a Franciscan priest, established San Xavier mission there. The present structure was started in 1700 and finished 79 years later after numerous raids by the Apache Indians. It is used to-day for religious services.

Tu'dor, the name of one of the royal families of England, reigning from 1485 to 1603. The family came from Owen Tudor, at one time a brewer in Anglesey, who fought at Agincourt and so pleased Catherine, widow of Henry V, by his dancing at a court pageant that she married him privately. The queen took refuge in a convent and Tudor was sent to prison to escape the popular fury, when their marriage became known. Tudor escaped, and was protected by Henry VI, the young king. The oldest son of this marriage was made Earl of Richmond, and married Margaret Beaufort, a descendant of John of Gaunt. Their son became Henry VII of England, and by marrying the daughter of Edward IV united the houses of York and Lancaster and ended the Wars of the Roses (1455–85). There were five Tudor sovereigns: Henry VII, Henry VIII, Edward VI, Mary and Elizabeth. Consult *Early Tudors* by Moberly and *History of England* (1529–88) by Froude.

Tufts College, a college formerly controlled by the Universalist denomination, but now undenominational, is located at Medford, Mass., near Boston. It comprises colleges of letters, divinity; medical, dental, and engineering schools and Jackson College for Women It has 262 instructors and 1,241 students.

Tuileries (*twē'le-riz*), **Palace of the,** a famous domicile of French royalty, now destroyed, in Paris, on the right bank of the Seine and adjoining the Louvre. The site originally was a tile-field, whence the origin of the name (the word signifying a tile-kiln). The palace was commenced in 1654 as a residence for Catherine de Medici, and was enlarged by Henry IV and by Louis XIV, the attached grounds being converted into ornamental gardens. When the palace of Versailles was erected, the Tuileries ceased to some extent to be used by the French kings. In the Revolution it was stormed and sacked by the frenzied Parisian mob (1792), and for a time became the seat of the national convention which governed France after abolishing monarchy. The Tuileries were also attacked and taken in the insurrections of 1830 and 1848, and during the Commune (1871) the buildings were burned, the ruins not being removed till 12 years later. Nothing of the palace remains except the pavilions which flanked it. In their restored order they terminate the two galleries or extended arms of the Louvre (*q. v.*).

Tu'la, a city in Russia, on Upa River, 110 miles south of Moscow. It has a large cannon-factory and manufactory of arms, founded by Peter the Great, and nearly 800 other factories which supply the Russian army with arms. Cutlery, locks, tea-urns and bells are made in large quantities, and the preparation of bristles for market is a large industry. Population 150,000.

Tu'lip, species of *Tulipa*, a genus of the lily family, and native to Central Asia. They are extensively cultivated for their beautiful flowers, and over 1,000 garden-varieties have been catalogued. Haarlem in Holland is the chief source for tulip bulbs. In the 17th century the cultivation of tulips became a mania in Holland, and enormous prices were often paid for single bulbs of some rare variety.

Tulip-Tree, the well-known *Liriodendron Tulipifera*, a member of the magnolia family, and most commonly but wrongly known as poplar. It is one of the most magnificent forest trees of the United States, with a noble shaft, great crown, broad and lobed leaves and tulip-like flowers. It is the source of the so-called poplar-lumber of commerce. The color of its wood has given it the name of white-wood; and in some localities it goes by the name of yellow poplar. The tree sometimes reaches a height of 190 feet, the ordinary height being from seventy to 100 feet. The tulip-tree is rare in New England and west of the Mississippi River, but is found as far south as Alabama and Georgia. It grows rapidly and is hardy. Always attractive, in its time of bloom it is of much charm, bearing a wealth of erect, cup-shaped, yellow-green blossoms.

Tulsa (*tŭl′sȧ*), a city and the seat of Tulsa County, Oklahoma, is situated on the Arkansas River, 225 miles south of Kansas City and 120 miles northeast of Oklahoma City. It is the oil capital of the world, because of its location in the very center of the petroleum industry of the South. Almost every major oil company maintains headquarters in the city, which is in the heart of the world famous Mid-Continent Oil Field. The region also produces natural gas and coal, and is rich in grain, dairy products, livestock and poultry. Tulsa is served by six railroads, and there are hundreds of miles of hard-surfaced roads in the vicinity. An excellent water system supplies the city with pure water from the Ozark Mountains. It is well paved and lighted, and possesses a number of beautiful parks and boulevards. Tulsa is noted for its many palatial homes which make its residential sections outstanding in loveliness. There are fine libraries, and the business section is modern, with a number of handsomely constructed office buildings. The schools are modern, the high school being the third largest in the United States. Parochial and private schools are also situated here. The city is the seat of Tulsa University, which was founded in 1894. In 1932-3, it had an enrollment of 626 and a faculty of fifty.

Although Tulsa is primarily an oil city, its industries are diversified. There are numerous oil refineries, and manufactures of oil-well supplies, boilers and tubes, pumps, engines, tools and machinery. Coal is also a product. Other important industries include cotton-seed oil, coal, flour mills, brick and tile, sewerpipe, glass, sand and stone, and wood products.

Tulsa was first known to white men as a trading-post at the junction of the boundaries of the Cherokee, Creek and Osage Indian nations, known as "Tulsey Town." How old the Creek village was which originally stood there, is not known. Gradually the white man moved in, and the little settlement became a "cow town" as the chief industry in the West at that time centered in cattle. In 1882 a railroad connected the town with the West. At the turn of the century, oil was discovered a few miles from Tulsa. By the year 1907, Oklahoma had been admitted to statehood, and Tulsa began to develop oil properties extensively. In 1908 it adopted the commission form of government. The growth of Tulsa has been almost astounding. The population in 1900 was 1,390; in 1910, 18,182; in 1920, 72,075, and in 1930, 141,281.

Tumor (*tū′mẽr*), an abnormal mass of tissue arising from cells of preëxistent tissue, unrestrained in growth and structure, and possessing no physiological function. It is utterly independent of the needs of the organism and has no obvious cause, although contributory causes are age, sex, local irritation, and mechanical injury. Bacteria formation and overgrowths of bone or skin are sometimes confused with tumor. Microscopic examination of a bit of the affected tissue is necessary before a definite diagnosis can be made. Simple tumors spread only by increase in size, but malignant tumors tend to recur after removal and to spread by secondary growths at more or less distance from the primary growth. Often the secondary growths are caused by a fragment of the tumor being conveyed through a lymph-vessel or blood-vessel to some distant organ or gland.

The connective-tissue tumors are chiefly simple, growing slowly, although a few become malignant. They are usually encapsulated. The malignant tumors of this type are *sarcomata* or *endotheliomata.* Sarcomata have no capsule, and consequently invade neighboring tissues, and organs, growing rapidly. The epithelial tumors contain epithelium as an essential feature. When simple they are either glandular or else of a formation similar to warts. This type in the larynx may cause suffocation, or in the bladder produce fatal anæmia from continued hemorrhage. Malignant epithelial tumors are *carcinomata.* Muscle-tissue tumors are rare except in the uterus, where they are usually called "fibroids." The nerve-tissue tumors are extremely rare, being found occasionally in the stump of an amputated limb. *Angiomata* are newly formed blood-vessels or lymphatics, such as the "wine-stains" and "strawberry marks" on the face.

In the majority of cases, the only treatment possible for a tumor is its removal by a surgical operation at the earliest possible moment. It is a very common thing to confuse cancer and tumor. Tumor is the general name for all such growths, and includes the cancers, which belong to the group of epithelial tumors. An interesting development is the phantom tumor, a purely hysterical affection which often simulates pregnancy.

See CANCER.

Tundras (*to͝on′drȧs*), a word of Russian derivation which is applied to the level or undulating treeless plains in Arctic America, Asia and Europe. Such regions are characterized as swamps of black mucky soil, the subsoil of which is permanently frozen. There exists a dense growth of mosses and lichens, such as the snow-white reindeer moss, and dwarf cepitose herbs and shrubs. The remains of many extinct animals lie in the frozen subsoil.

Tung Oil or **China Wood Oil,** an important vegetable oil yielded by the seeds of two species of the *Aleurites,* trees of the *Spurge* family, common to certain regions of China. The oil has become a most important raw material in the manufacture of paints and varnishes and for waterproofing wood and other materials. The name "tung oil" has been derived from the heart-shaped leaves of the tree. The Chinese word for heart is *tung,* hence the name "tung oil."

The two species of trees grown in China which yield this valuable oil are the *tung-yu shu* (tung oil tree) or *Aleurites fordu,* and the *mu-yu shu* (wood-oil tree) or *Aleurites montana.* The former is native to the Yangtze Valley in central and western China, while the latter grows abundantly in South China about the Sikiang River. The *tung-yu shu* has proved to be the most outstanding source of tung oil. It is this type of tree which has been most successfully grown in southern United States. The tung oil tree grows rapidly but seldom reaches a height of more than twenty-five feet at maturity. The tree is characterized by its low-spreading branches and a trunk ranging from six to twelve inches in diameter of white wood covered with pale gray bark. Each spring the tree blossoms. The flowers are white with pink and yellow markings near the base of the petals. Then appears the fruit of the tree, a tough green textured pulpy covering over a nutlike shell. It is this fruit which bears the valuable oil producing seeds. When ripe, usually in September and October, the fruit looks much like a brown walnut. There are usually five seeds in each shell.

The tree is hardy, growing wild for the most part in China. There may be large groves of the species or they may grow few and scattered. They thrive in poor soil, although it has been proved in the United States that the average productive life of the tree, which is for a period of from twelve to twenty years in China, can be materially lengthened at least ten years and its seed yield increased in both quality and volume, by development of the tree under favorable climatic and soil conditions.

It has only been within recent years that China has evinced any great interest in the cultivation of tung trees, although tung oil has been an important Chinese export for several centuries. To-day, both Provincial and National authorities have come to realize the economic importance of tung oil and have undertaken additional plantings to meet the increasing demand. The tung tree is most extensively cultivated in the Provinces of Hunan and Kwangsi. In Chekiang Province there are some plantations which have excellent trees grown from seeds, not transplanted.

The first tung oil seeds to reach the United States were sent in 1902 by Hon. L. S. Wilcox, United States Consul General at Hanchow, China. In 1904 Consul General Wilcox sent a small supply of these seeds to Washington. Under the direction of the United States Department of Agriculture several experimenters went out with these seeds to the warmer sections of the country. After three years not a single plant or tree had survived the new soil and climate. The Bureau of Plant Industry in 1905 received a large shipment of seeds which were planted at the Plant Production Garden of the Division of Foreign Plant Introduction at Chico, California. The result this time was a fairly large number of seedling trees. One year later these trees were shipped to the various State Experiment Stations throughout the country for test plantings. It was discovered that the *Aleurites fordu* could be successfully cultivated only in the Southern States while the *Aleurites montana* was grown most successfully in subtropical regions. The greatest interest in the new industry was exhibited in Florida.

The beginning of the Florida industry is most unusual. In 1906, Dr. Fairchild at Chico, California, sent five of the first seedlings to the superintendent of a Florida cemetery at Tallahassee. They were planted but received little care. In the autumn of that year, William H. Raynes of Tallahassee became interested in the plants and received permission to transplant them. One of those trees survived and still stands. There followed, through the enthusiasm of Mr. Raynes, the development of the first bearing grove of tung trees in America. Dr. Tennent Ronalds, a neighbor of Mr. Raynes, with 100 seedlings from the original tree, planted a four acre grove in 1912 which was later enlarged to forty acres. In 1913 the Raynes tree supplied a large enough crop by which it was possible to make the first test of tung oil in the United States. The oil yield was 2.2 gallons from a bushel of whole fruits. This experiment was conducted by the Paint Manufacturer's Association of the United States. Since 1921 every effort has been put forth to stimulate the planting of tung trees. In 1923 the American Tung Oil Corporation was organized as a subsidiary of the American Paint and Varnish Company. The oil derived from these domestic trees has been found to be of better color and quality than that produced in China. Particular attention has been given to the planting of the seed or seedling tree, its soil, soil reaction, fruit bud development, suitable cover crops, fertilizing needs, and yield, all of which will be especially valuable to prospective planters. On April 1, 1932 it was estimated that there were 31,000 acres under cultivation of the Tung Oil tree in the United States. This acreage was scattered over six states, Florida, Mississippi, Georgia, Louisiana, Alabama and Texas.

There are two types of the *Aleurites fordu* under cultivation in the United States. The one, a single type, bears a single fruit on a twig, while the other, the cluster type, yields from two to twenty nuts per twig. In the cultivation of seedlings it has been found necessary to prevent and eliminate weed growth and prevent the soil from packing too greatly around the slender stalks. When the trees mature, however, the low-spreading branches tend to create shade areas which discourage the growth of weeds. Like all fruit yielding trees, the tung oil tree must be protected against insect attacks or fungus growths. This tree, up to the present time, has been attacked by only one root parasite, the nematode; one fungus disease, the thread blight; and one bacterial disease, a leaf spot. The only insects which have been found on the tree are the latania, cottony cushion, and ivy scales, all scale insects. It has not been necessary as yet, however, to spray trees in the United States since no great parasitic attacks have been evidenced. Much research work has been engaged in here in the United States whereby the general characteristics of the tree have been studied and led to improved planting practices, fertilization, proper soil and drainage requirements, and general care of the tree which have led to an increased nut yield.

Tung oil occupies a place in industry as yet unrivalled by any other drying oil. It is most valuable due to its rapid drying qualities and the impermeable film resistant to acids and alkalies which it forms upon drying. It dries chiefly by polymerization (a spontaneous molecular transformation). It is chemically composed of *glyceride* of a fatty acid known as elaeostearic acid (believed to be isomeric with linolenic acid). This oil also contains about ten per cent of the glycerides of oleic acid and two to three per cent of the glycerides of saturated such fatty acids as palmitic and stearic. Tung oil is still under scientific chemical research so as to improve upon its usefulness in industry.

At present it is most valuable in the making of varnishes and enamels in that it produces a varnish more resistant and waterproof than linseed oil and fossil gums. Its use in the manufacturing of varnishes extends over a wide field which includes household varnishes, as well as those employed in tinware coatings, lithographic varnishes, insulating varnishes and in aeronautical equipment particularly in the Army and Navy. In China tung oil is used extensively in the manufacturing of Chinese lacquers. Tung oil is also used in textile manufacturing in the preparation and finishing of linoleum, oilcloth, artificial leather and felt-base floor covering. Several automobile manufacturers now employ tung oil with asbestos and cotton in manufacturing brake linings. It has been found of especial value in the manufacture of printing inks. In 1929, 437,000 pounds of tung oil were used in the American printing and ink industry. It has been used in the Orient in the manufacture of waterproof India inks. During the World War it was used extensively in the making of soaps. It has also been of great value in the preserving of woods against termites, on a waterproof, transparent coating for concrete, and in the Orient is reputed to have valuable medicinal properties, particularly in the treatment of wounds and in skin diseases, and as a purgative.

Constant research is being conducted which will undoubtedly find new fields for the use of tung oil.

Since 1869, experimental plantings of the tung tree have proved successful not only in the United States, but in the British Dominions and Colonies, in Argentina and in Paraguay, although the tung oil industry progressed more rapidly in the United States than in any other country outside of the Orient. It not only stimulates agricultural activity in southern United States, but will stimulate industrial activity throughout the country.

Tungsten (*tŭng'stĕn*), a rare and valuable chemical element of the chromium group. It is not found free but combined with certain minerals such as wolframite and scheelite. Its chemical symbol is W; its atomic weight, 184.0. The supply of wolframite throughout the world is limited, but the metallic compound is widely distributed in the United States, Canada, England, Europe, Australia and South America. As commonly found, tungsten is grayish in color, and very hard, brittle and heavy. Pure tungsten is white and ductile. This rare chemical element will dissolve in nitric acid, and weighs 16.6 times the same volume as water. It melts only at the extremely high temperature of 3400 degrees Centigrade (6150 degrees Fahrenheit). Because of its great resistance to heat, tungsten has been found of great value in the manufacture of light filaments which must stand great heat without melting. Electric glow lamps, having metallic tungsten filaments, may be maintained at unusually high temperatures and under such conditions require an expenditure of only about 1.25 watts per candle power. Such filaments are considered superior to those manufactured of bamboo or carbon.

Tungsten is also mixed with steel to render it hard. Tungsten steel is particularly noted for its tenacity and hardness which resists even extreme degrees of heat. Tungsten steel frequently contains manganese. Magnets made of such steel have been found to be highly permanent. When mixed with aluminum there results a light and strong metal which is especially valuable in the manufacture of automobiles.

An alloy of tungsten, rust-resistant, is used for tool steel, and tungsten added to the steel used in heavy guns and battleship armor greatly increases their strength. The pure tungsten is sufficiently hard to scratch glass, and fuses at a higher temperature than any metal known. It was long mistaken for tin. An important drawback to the use of tungsten is its great expense.

This chemical element was first isolated in 1783 by the d'Elhujart brothers. In 1771 Scheele had been successful in isolating tungstic acid.

See Chemistry.

Tungus (*tŏŏn-gōōz'*), a member of any tribe of a group of Ural-Altaic stock, which are scattered over the region between the Yenisei River and the Pacific Ocean. The chief divisions are the Tungus proper, or Reindeer Tungus, which inhabit the region north of the Amur River; the Lamuts, on the shores of the Sea of Okhotsk; the Samaghirs and Negdas, on the banks of the northern tributaries of the Amur; the Golds and Manzus, on the Ussuri River and the Lower Amur; the Oroks, which inhabit Sakhalin Island; the Solons and Daurs in the Upper Nonni basin, and the Manchus, who gained ascendancy over China in 1643 and ruled until 1912.

The Tungus are distinctly Mongolian in type. With the exception of the civilized Manchus, they are chiefly fishers, hunters, trappers and shepherds. The majority of them are Shamanists in religion. They are noted for their cheerfulness and self-reliance, for their remarkable powers of endurance and their high moral qualities. The only cultivated Tungus language is Manchu. One group of Tungus embraces the orthodox Russian faith.

Tunicata (*tū-nĭ-kā'tȧ*), an interesting group of marine animals, the adult bodies of which are surrounded by a tunic from which their name is derived. They include the sea-squirts, which have a habit of ejecting little jets of water from their terminal openings when irritated. They formerly were classified with worms or between the worms and the mollusks. In 1866, however, Kovalevsky, by observing their development, showed that in the early stages of life they approximate the structure of tadpole or of frog. Moreover, the steps in their development were shown to agree fully with those of the lowest recognized vertebrate, *Amphioxus.* The adult animals are fixed or sessile. The larvæ are free-swimming and, in some particulars, on a higher plane than the adults. They, for example, have a gristly rod or notochord in the back of the body and, above this, a nerve-cord in the same position as in vertebrated animals. They also possess gill-clefts. The notochord and dorsal nerve-cord disappear in the adult, but their presence in the larva makes it necessary to advance the tunicata into the vertebrated group, and it is now recognized that the possession of a notochord, a dorsal nerve-cord and gill-clefts marks the vertebrated animals and distinguishes them from all others. The work of Kovalevsky was epoch-making, because it broke down the supposed barrier between vertebrates and invertebrates, and opened the way for considering their affinities in an unbiased spirit. The tunicata are ovoid or barrel-shaped animals attached at one end to stones, weeds or other objects. The free end has two openings through one of which water enters which circulates through the gills, and passes out of the other end. They afford an illustration of degeneration in development. When free-swimming in their youth, the tunicata are on a higher level but they soon become attached and, losing some of their organs, undergo retrograde development.

See Vertebrates.

Tuning, a term used in radio telephony to indicate the operation of adjusting a tuned circuit. This tuned circuit is an oscillatory circuit with an adjusted resonant frequency having a desired value. The tuned circuit is adjusted so that it will give resonance at any desired frequency. Various terms are used to indicate processes in tuning, as the tuner, tuning coil or tuning inductance, tuning condenser and aerial tuning condensers. A tuning fork is employed, which is a piece of steel designed in such a way that it has a natural period of vibration of a definite frequency. Through the use of a thermionic tube circuit these vibrations are maintained and employed as a frequency standard. A mechanical arrangement called the ganged control is used for tuning the several high-frequency circuits in a receiving set by one handle.

When a sending or receiving set can transmit or receive only a wave of a given length, it is said to be sharply tuned. If the frequency of the applied voltage in the circuit is constant, and a large change in its resonant frequency is accompanied by a small change in the amplitude of the oscillatory current, the circuit is said to be flatly tuned.

Before the start of an actual program, the carrier wave of a broadcast transmitter is modulated with some form of continuous low-frequency note called the tuning note, which is radiated so that the listeners can tune in their receivers. Often this tuning note is an identification, peculiar to a particular station.

See Radio.

Tuning Fork, a steel instrument which is used for tuning musical instruments and to indicate the correct pitch of some particular note in the musical scale. This small percussion instrument consists of two prongs and a handle, which, when struck, produces a certain fixed tone. Its tone is almost entirely free from harmonics. It is not affected by moderate changes of temperature.

Tunis (*tū'nĭs*), once an independent state in what was called Barbary, is a French protectorate in Africa. It is bounded on the north and east by the Mediterranean Sea, on the south by Tripoli and the Sahara, and on the west by Algeria. It is 440 miles long from north to south and 115 wide, extending over an area of 48,300 square miles. It includes that portion of the Sahara which is east of the Djerid. The coast is irregular, and there is only one river, but there are many salt-marshes. Capes Blanco and Bon on the northern coast are the northernmost points of Africa. The northwestern portion of Tunis is mountainous, some peaks soaring upward 5,000 feet. The southern portion is a great *steppe.* Tunis is a fertile land as evidenced by the fact that the mountains being covered with great forests of oak and barley, figs, maize, olives, oranges and wheat being produced abundantly. The olives are specially cultivated for their oil, and the wheat is exported in great quantities. Great herds of cattle graze on the plains, the horses and dromedaries are celebrated, and the sheep are famous for their wool. Copper, iron, lead, mercury, niter, phosphates, salt and silver are found, the production of phosphates being so large that a railway was built to transport it. There also are fine mineral springs and considerable fisheries. Trade is mainly with the interior, which sends gold, gums, ivory and ostrich-feathers for European countries. The people are Arabs mainly, but the population is of the most mixed character, containing traces of the ancient Numidian, Phœnician and Roman elements. There are 128,895 Europeans, Italians numbering 81,156, Frenchmen 34,610, while the native Jews total 60,000. The French army of occupancy numbers 20,362. The prevailing religion is Mohammedanism, and the revenue from Mohammedan property is applied to religious, educational and charitable purposes. The Christians include 35,000 Roman Catholics, with English and French Protestants and the native converts of their missions.

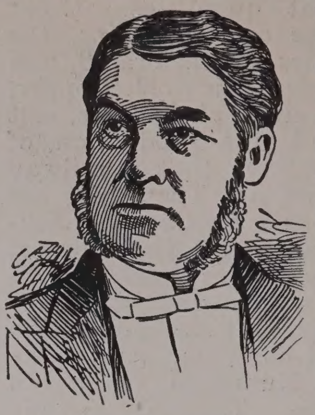
Under the Romans Tunis was about the same region as Carthage. It was conquered by the Vandals in the fifth, the Byzantines in the sixth and the Arabs in the seventh century. Louis IX of France (St. Louis) invaded it in 1270, Charles V of the Empire in 1525. Turki of Crete made himself master of the land in 1575, acknowledging, however, the suzerainty of the Turkish sultan at Constantinople. His descendants have occupied the throne since 1691, paying tribute to Turkey till 1871. Tunis was a nest of pirates down to 1816. France invaded the country in 1881, and forced the reigning prince, called a *bey*, to put himself under French protection. Government is administered by the French foreign office through a resident-general and his cabinet of nine ministers, two of these being Arabs. The governors of the 13 districts into which the land is divided are French, their subordinates Arabs. The French have suppressed the slave-trade, lifted burdensome taxes, established courts and provided municipal government for the capital. A department of arts and antiquities has been established, and a national museum formed. There are about 200 French and 1,500 Mohammedan schools, beside many private schools and a Muslim university. The French schools teach nearly 25,000 pupils. There are 704 miles of railroad, all in French hands, and $15,000,000 are being spent on building 356 miles more and on colonization. There also are 1,750 miles of good highroads, 2,250 of telegraph and 300 of telephone, and about 375 postoffices. The principal commercial ports are Tunis-Goletta, Susa and Sfax. The chief exports after wheat are barley and oats, cattle and sheep, hides, olive-oil, phosphates, zinc, lead and woolens. The main imports consist of ironwares, wheat, flour, barley, machinery, oats, sugar, coal, woolens, tobacco and coffee.

Tunis, the capital of the protectorate of Tunis, is near the mouth of the Mejirdah, about ten miles from the ruins of Carthage. It has a wall five miles around and a strong castle. The streets are narrow and dirty, and the houses of one story, with no windows on the outside. The bey's palace and some of the mosques are fine buildings, and the bazars are attractive. There are a Muslim university in the Great Mosque, a Roman Catholic cathedral, a Greek church, an Italian theater and large barracks. A national museum has been founded near Tunis, the Franco-Tunisian government having formed a department of Tunisian arts and antiquities. By means of a canal, opened in 1893, Tunis is accessible to oceanic commerce. It also has railroad connection with Algiers. The manufactures are of silk, wool, leather, soap, wax and olive-oil. Population 177,500, of whom 100,000 are Moslems and 50,000 Jews.

Tun'nel, an underground passage dug out without removing the earth above it. Tunnels are dug under bodies of water, and through mountains when the passage over or around would be less economical or less convenient. They may also be made under roads and streets for convenience of passage. The digging or boring of tunnels presents many different problems, depending on the character of the soil. In a mountainous country the operation usually involves drilling and blasting rock. Water is nearly always met with, particularly under rivers and lakes, and the methods of the pneumatic caisson have to be used. Most tunnels have to be lined with timber or masonry arches, to keep the roof and sides from caving in, and a common method is to carry forward with the digging a steel tube as lining for the excavation. The cost of tunneling has decreased greatly within a few years, owing to the introduction of special machinery for drilling and excavating. The number of large tunnels is now so great that it is impossible even to list them. The most notable ones in Europe are the Mt. Cenis, eight miles long, costing $15,000,000; the St Gothard, nine miles long, cost $12,000,000; and the Simplon tunnel, 12.3 miles long, cost $14,000,000. The Hoosac tunnel, on the railroad from Boston, Mass., to Troy, New York, is 4¾ miles long. It was 17 years in construction, and cost $11,000,000. Other notable American tunnels are the Grand Trunk railroad tunnel at Port Huron, Mich., under St. Clair River; the Chicago water-supply tunnel, four miles out under Lake Michigan, the Sutro tunnel at the Comstock mines, Nevada. The Hudson River tunnels were constructed to give direct rail communication between Manhattan Island and the New Jersey shore. The Pennsylvania Railroad tunnels were begun in 1904, and connections under the river were made in October, 1906. The Hudson "tubes," constructed and operated by the Hudson & Manhattan Railroad Co., are practically a part of the city's subway system. It is conservatively estimated that 100,000,000 passengers annually travel through the four tubes of the Hudson tunnel system. It continues through a subway across the city and connects with one of the three tunnels under East River, a second connecting the street car system of New York City with that of Long Island City and the third being the Brooklyn extension of the New York subway on from the Battery. (See New York City). The subway itself is 21 miles long, the greatest municipal undertaking of modern times, and is estimated to have cost $50,000,000. It has two tracks for expresses and two for local trains. In Chicago (*q. v.*) there is a subway with 45 miles of track in operation and 15 miles of extensions projected. It, however, is used only for freight-distribution in the business district. Among notable recent tunnels are those bored by the Southern Pacific Railroad at Santa Margarita, Cal., so as to extend their railroad along the coast from San Francisco to Los Angeles.

Tun'ny, a fish of the mackerel family, found in the Atlantic Ocean, and especially in the Mediterranean Sea. It is a very large fish, from nine to 20 feet long, sometimes weighing 1,000 pounds. It is thicker than the mackerel, dark blue, with silvery spots. The European variety is highly esteemed for food, and is caught in nets shaped like a funnel, the fish entering the wide mouth and being driven to the narrow end, where they are killed with lances and harpoons. Near Constantinople it appears in shoals so crowded that they are often taken by hand. The best tunny-fisheries are in Spain, Italy and Sardinia. The American tunny, found on the Atlantic coasts from New York to Nova Scotia, is black above and white below, and is used largely for oil, one fish sometimes yielding 20 gallons.

Tup'per, Sir **Charles,** G. C. M. G., Canadian statesman, was born at Amherst, Nova Scotia, July 2, 1821, and was educated at Edinburgh, Scotland, for the medical profession. From 1857 to 1860, having entered politics, he was a member of the executive council and provincial secretary of Nova Scotia, and from 1864 until federation he was prime minister. He was a strong advocate of Canadian federation, and in 1870 joined the Dominion cabinet, in which he held various portfolios and was one of the leaders of the Conservative party. As minister of railways and canals, he advocated the construction of the Canadian Pacific, for a time was finance-minister, was Canadian representative at the fisheries conference at Washington, D. C. (1887), and in 1896 became prime minister of the Canadian Dominion. From 1883 to 1887 he had been high commissioner for Canada in England. In the general election of 1896 his administration was defeated on the Manitoba school-bill. Mr. Tupper was knighted in 1879, created a baronet in 1888, and for a long time was leader of the (Conservative) opposition in the Dominion house of commons. He died Oct. 30, 1915. His son, Sir C. Hibbert Tupper, born in 1855, was minister of justice and attorney-general for Canada, 1895-6. He for a time was a member of the Canadian house of commons, representing Pictou, Nova Scotia. In 1892 he was created a K. C. M. G. for services rendered as agent of H. B. M. at the Paris Tribunal of Arbitation.



SIR C. TUPPER

Tupper, Martin Farquhar, an English author, was born at London, July 17, 1810. He was a graduate of Oxford, and was admitted to the bar In 1838 he published *Proverbial Philosophy*, which was very popular with the people, though ridiculed by the critics, and has passed through 40 editions. His numerous works include *Crock of Gold; Hymns for All Nations; Stephen Langton;* and *Three Hundred Sonnets*, none of which at all equaled his first work in popularity. He died on Nov. 29, 1889.

Tura'nians, one of the large divisions of the human race. (Finno-Tartar and Ural-Altaic are other names for it.) It includes the Hungarians, Bulgarians, Lapps and Finns, with other tribes in Europe; the Samoyeds, living in the northern part of Asia; the Turks or Tartars, forming the largest division; the Mongols, divided into eastern Mongols and Buriats; and the Manchus, the principal race of the Tungusian branch, the present ruling people in China. Of these various tribes, those living in Europe are the most advanced in languages and customs, and those in northern Asia are the lowest of the race. The name usually given to those related tribes is taken from the Persians, who, calling their own country Iran, named the countries north of it Turan. They sometimes are called Mongolian, Scythian or Tartaric races. The Turanian languages do not present the same unmistakable family likeness as the Aryan and Semitic groups, and scholars differ in regard to them, some including the Dravidian dialects of southern India and others considering the Mongol and Manchu dialects to be distinct languages. The Finnic branch of languages is superior to the others, having some national literature, as the legendary and popular songs of the Finns and Hungarians. Consult Müller's *Science of Languages* or Peile's *Philology*. See AUSTRIA-HUNGARY, FINLAND and LITERATURE.

Tur'bine, a form of steam-engine in which the rotation is produced by the impact of a jet of escaping steam on the blades of a wheel. There are two forms of the turbine in use: the Parsons and the De Laval. In the Parsons turbine the steam from the boiler strikes the blades of a series of turbines fixed on one shaft, and finally escapes into a condenser or into the atmosphere at a low pressure. In the De Laval turbine the jet of high-pressure steam strikes a series of steel-buckets on a wheel similar to a Pelton water-wheel. The speed of turbines is very high. That of a 150 H. P. Parsons turbine is 4,800 revolutions per minute, while that of a 50 H. P. De Laval machine has the enormous speed of 15,000 revolutions per minute. These very high speeds require special reducing-gearing before use for most machinery. The Parsons turbine was first successfully used directly on dynamos and also on the shafts of the propeller of an experimental steamer, the *Turbina*. This was then the fastest boat in the world, having made 34½ knots per hour. It is 100 feet long, and has three turbines of a total H. P. of 2,000. Tests of turbines have shown a remarkably low consumption of steam per H. P., that of small turbines rivaling that of the best, large, compound steam-engines. For steamships a great advantage claimed, in addition to economy, is that of the small size and weight of the turbines. Mechanically the turbine has the great advantage over the piston steam-engine in that no mechanism is needed to change a backward and forward straight-line motion into rotary motion. Much is being done to develop the turbine, but practically there are only two ways of increasing its efficiency. One is to improve the machine; the other is to improve the management of the working fluid. In general, the larger the marine turbine, the simpler the construction, the higher the steam's efficiency and the lower the rate of rotation. In 1899 turbines 35 and 50 inches in diameter were used in *The Viper*, a torpedo-boat destroyer; and though this is only 210 feet long and of 375 tons displacement, the turbines developed 11,000 horse-power and over 43 miles an hour. No vibration was produced, the engine-room being so quiet that it was difficult to realize the presence of the engines. In 1901 the turbine was applied to passenger steamships and the steamer (of 1,429 tons) averaged 18½ knots an hour. The success was so pronounced that the Cunard Company at once built The Lusitania and The Mauretania (see STEAMSHIPS) and equipped each with quadruple-screw turbines. The commercial practicability of the turbine has been demonstrated.

Tur'bot, one of the flatfishes found in almost all European seas. It ranges from the Mediterranean to the coast of Scandinavia. It is highly esteemed as food, being the best of all the flatfishes in that regard. It is a large fish, sometimes reaching a weight of 70 pounds, but that weight is very exceptional. It feeds on crabs, small fishes, sea-urchins and fish-eggs. The true turbot does not occur on the American coast. An entirely different flatfish, of smaller size, is incorrectly called turbot in the United States. See FLATFISH.

Turenne (*tü'rĕn'*), **Henri de la Tour D'Auvergne,** Viscount de, a great French soldier, was born at Sedan on Sept. 11, 1611. He was sent to Holland to study the art of war under an uncle of his, the celebrated Maurice of Nassau. He joined the French army, serving in Germany, where he relieved Mainz, besieged by the emperor's army. He then was attached to the Swedish army under Bernhard of Saxe-Weimar, where he captured several towns, and later defeated the Austrians and Spaniards at Casale and took Turin. After his conquest of Roussillon in 1642, he was made a marshal of France and given chief command on the Rhine, when he defeated the Bavarians at Rottwell, but was himself defeated at Marienthal. With Condé he avenged this defeat at Nördlingen. Turenne finished the war by conquering the electorate of Treves and (with the help of the Swedes) Bavaria, and conducted a successful campaign in Flanders. In the civil wars in France Condé and Turenne, the two greatest generals of the period, were on opposite sides, and Turenne with inferior forces was uniformly victorious, finally driving Condé from France. He then conquered much of the Spanish Netherlands. Louis XIV made him marshal-general of France, and only his Protestantism prevented his being appointed constable. Bossuet's celebrated *Exposition of Christian Doctrine* was written at the king's suggestion to effect the conversion of Turenne to Roman Catholicism, and aided by the king's solicitations was successful. In the campaign in Holland in 1672 he compelled the Elector of Brandenburg to beg for peace. His last campaign is disfigured by the devastation of the Palatinate, where he burned 30 towns. His desire to retire could not be gratified, as he was the only general that could successfully oppose Montecuculi, the great Austrian general, and for nearly half a year their strategy was the admiration of Europe. Having forced his antagonist to a battle at Sasbach, Turenne was viewing the preparations for the attack, when he was killed by a stray ball on July 27, 1675. He was buried by order of the king at St. Denis, the place of the royal sepulchers. His monument was injured during the Revolution, but was finally placed beside that of Napoleon in the Hotel des Invalides, in Paris. See *Life* by Cockayne.

Turgenev or **Turgenieff** (*tòór-gĕ'nyĕf*), **Ivan,** a Russian writer, was born at Orel on Oct. 28 (= Nov. 9), 1818. After studying at Moscow, St. Petersburg and Berlin, he obtained a position in the department of the interior at St. Petersburg. On account of his liberal ideas he was banished for a period, but was finally allowed to return to Russia. His home, however. for the most part was at Paris and at Baden. Many of his works were written in French, and have been translated into English and German. Among his best known novels are *Fathers and Sons, Liza, Smoke, Dimitri Rudin, Journal of a Useless Man* and *Virgin Soil.* He died on Sept. 3, 1883.

Tur'gor (in plants), the state of a cell when its wall is stretched by pressure of the water within it. Every active cell is normally turgid if adequately supplied with water, because the absorption of water by the protoplasm goes on until the elastic resistance of the wall balances the force (osmotic pressure) which determines the entrance of the water. The turgor varies from time to time and in different plants, but ordinarily equals three to six atmospheres, and in special conditions may rise much higher.

Turgot (*tür'gō'*), **Anne Robert Jacques,** a French statesman, was born at Paris, May 10, 1727. He was educated for the church, and was prior of the Sorbonne in 1749. In 1752 he studied law and became councilor in Parliament. He was given charge of the province of Limousin in 1761, where he introduced many reforms, as abolishing the method of mending the roads by the compulsory labor of the poor. He introduced the cultivation of the potato and other means of subsistence for the people. Under Louis XVI he was put in charge of the finances of the country, which were in a terrible state of disorder. His reforms included free trade in wheat in the interior of the kingdom, the doing away with the obligation to labor for the state and substituting a single tax on land for general taxes. He reduced the expenses of the government, and introduced exactness and faithfulness into the service. If his plans had been received with favor by the nobility and statesmen, France might have been spared the horrors of the Revolution. But the combination against him was so strong that the king yielded, and Turgot retired after 20 months of service. Among his writings are *Reflections upon the Formation and Distribution of Riches* and *Usury.* In writing on the American war, his views of the nature of colonies have since been generally adopted. His Latin inscription for the portrait of Franklin is celebrated: *Eripuit cœlo fulmen, sceptrumque tyrannis.* (He snatched the thunderbolt from heaven, and the scepter from tyrants.) Turgot died at Paris, March 20, 1781. See *Life* by Say.

Turin (*tū'rĭn*) or **Torino,** a city in northern Italy, once the capital of the kingdom, is 75 miles southwest of Milan and on the Po. It is one of the handsomest cities in Europe, famed for beautiful squares, fine bridges and pleasant promenades. Among the squares are Piazza San Carlo, with a statue of Emmanuel Philibert of Savoy; Piazza Vittorio Emmanuele, the finest square in Europe; and Piazza Castello, in which are the royal palace, with its fine library and armory, the old palace of the dukes of Savoy, the military academy and the theater. There are a fine, five-arched bridge across the Po, begun by Napoleon with money obtained from the offerings at the cathedral and finished by the kings of Sardinia, and a beautiful single-arched one over the Dora. The cathedral, built in the 7th century, is the oldest church, and that of San Filippo the handsomest. The university, founded in 1404, has 68 teachers, 2,750 students and a large library, including that of Cavour, which was bequeathed to it. The Academy of Science has the finest Egyptian museum in Europe. The manufactures are woolen and silk goods, jewelry, paper, pottery, pianos and carriages. Turin was settled by the Taurini, a Ligurian tribe. Hannibal sacked the city after crossing the Alps. In 166 B. C. it became a Roman colony, and on the fall of the empire went to the Lombards. Charlemagne made it the residence of the duke of Susa; and in 1032 it became the possession of the house of Savoy. The French held it for 60 years from 1506 and in 1640, and in 1800 it was united to the French empire. In 1815 it was restored to Savoy, and was the capital of Sardinia until 1860 and of Italy until 1865. Population 371,000.

Turkestan (*tōōr'kĕs-tăn'*), (the country of the Turks), is a country in Central Asia, lying between the Russian dominions on the north and Persia and Afghanistan on the south. It is divided into western and eastern Turkestan by the table-land of Pamir (*q. v.*), called the Roof of the World, which is about 15,000 feet high. Western Turkestan, once called Independent Tartary, consists of the great plain of the Caspian and Aral Seas and the hilly districts on its eastern border, formed by the western branches of the Hindu Kush Mountains. Eastern Turkestan, also called Chinese Tartary, includes the country east of the table-land, reaching to the desert-plains of the Gobi. The Oxus, Jaxartes and Zerafshan flow westward from the Pamir tableland, while the Yarkand and Kashgar are the most important rivers flowing eastward. The higher mountain-districts give fine pasturage in summer for flocks, and the upper valleys and plains are fertile and highly cultivated; but toward the Aral and Caspian Seas there are large regions of sandy and trackless wastes, many of them lower than the sea, where the wells are salt and both salt and sulphur are found. The portion of eastern Turkestan near the Pamir tableland is mountainous, and the center is a great plain, with fertile belts along the streams, but most of the country is a desert, except where it is irrigated. Gold, silver, iron, copper, niter, sulphur, asbestos, agate and jasper are found; while the field-products are cotton, rice, wheat, hemp, flax, barley, corn, tobacco and most of the common fruits. The great article of export is cattle. Manufactures of silk and cotton goods, sabers and knives exist. In western Turkestan the people are Turks or Tartars and Tajiks or Aryans. They also are divided into the settled population and the nomad or wandering tribes. The religion is Mohammedanism. The people are jealous of foreigners, so that the country has been very difficult of access by Europeans. The inhabitants of eastern Turkestan are varied, the Turanian element being the most prominent. The villages are a collection of walled inclosures, surrounding houses and gardens.

Turkestan has had an important part in Asiatic history. Most of the western part belonged to the Persian empire, and many of its large cities were built by the Persians. It went with Persia into the hands of the Macedonians, part of it becoming a Greek province. In the 8th century the Arabs had possession, and it was finally overrun by the Mongol hordes of Genghis Khan (*q. v.*). Under Timur (*q. v.*) it was the center of a great empire, stretching from Moscow to the Ganges and from the Hellespont to China; its cities were adorned by the spoils of victory; and colonies of learned men and skilled artisans were brought to the country. The empire split into fragments on the death of Timur's youngest son, and various independent states were formed out of what now is Turkestan. In 1792 the present Uzbeg dynasty obtained the throne. The later history of Turkestan is a series of wars between Bokhara, Khiva and Khokan; of raids of the Turkomans along the Persian border; and of the progress of Russian conquest. Russian Turkestan covered over 400,000 square miles of territory. With the disintregration of the Empire following the revolution, Russian Turkestan declared its independence. Of the inhabitants comparatively few are Russians. The capital, Tashkend, has 106,000 people. The farming class is described by travelers as honest, industrious, and sober, but the richer inhabitants of the cities are corrupt. One good result of Russian occupation was the abolishment of slavery and the cruel tortures which characterized Turkish rule, and of the internal wars between the Mohammedans and people of other faiths.

Tur'key, a large bird related to the pheasants and originally inhabiting the New World. There are three species known: the North American, the Mexican and the Central American bird. The Mexican turkey was domesticated by the Indians before the discovery of Mexico by the European, and is the original from which the domesticated birds are descended. It was introduced into France and England in the 16th century, and is imported all over the world. The turkey of Central America excels all others in variety and splendor of plumage, which combines metallic green, blue, black, yellow and red. It lives in the open forest and the open country, rather than in the deep forests, like the wild turkey of North America. The male has no tuft on the neck. The common wild turkey of North America ranges from southern Canada to Florida and Mexico, but has been so persistently hunted that it is found only in remote swamp and woodland or mountain region far from haunts of man. It is about four feet long, being the largest game-bird, has plumage of a metallic bronze; the bill and head are red, the head and neck bare; from the center of the breast of the male hangs a beard-like tuft. The hen is a devoted mother, but her young have a serious struggle for existence, snakes, hawks and other enemies disturbing and destroying them.

Turkey-Buzzard, a bird belonging to the group of the New-World vultures. It abounds in the warmer parts of North and South America, and ranges throughout the United States, except in New England. This bird is about 27 to 30 inches long. It has a dark plumage, with a violet and greenish luster on the upper parts. The bill is white, and the head and upper parts of the neck, which are destitute of feathers, are reddish. It feeds on carrion. See BUZZARD and VULTURE.

Turkey up to the Balkan war (*q. v.*) consisted of those countries in Europe, Asia and Africa under the control of the sultan, though it is usually limited to Turkey in Europe and Turkey in Asia, called Turkey proper. Including all subject states, it covered 1,565,000 square miles and had a population of 35,400,000. Turkey in Europe had been reduced to a territory stretching from the Black Sea to the Adriatic, from the Ægean Sea and Greece on the south to the Balkan Mountains and north of them to about 43° north latitude, covering 65,350 square miles, with a population of 6,130,200, made up mainly of Turks, Greeks, Bulgarians and Albanians. Turkey in Asia covers 693,610 square miles, with a population of 17,683,500, consisting of some 4,000,000 Arabs, besides Turks, Greeks, Kurds, Circassians, Armenians and Jews. It stretches from the Black Sea to Arabia and the Mediterranean and from the Aegean to Persia. Tripoli was taken by Italy in 1911, and Turkish nominal rule over Egypt (*q. v.*) ended in 1915.

Surface. Turkey proper has a great extent of coast, broken by bays, gulfs and islands, with many fine harbors. The Dead Sea in Palestine and Lake Van in Armenia are among its many large salt-lakes. The Taurus and Anti-Taurus ranges and the Syrian mountains are among its principal ranges, while a large part of what before the Balkan war was European Turkey is mountainous, and in Asiatic Turkey elevated plains abound.

Climate. The winters are cold in the mountainous districts, but warm in the sheltered valleys, and the summers very hot, especially in Syria and Asia Minor. Very little rain falls from April to September, and many plains need irrigation to be cultivated. The highest peaks reach the region of perpetual snow.

Resources. The minerals are copper, lead, alum, silver, emery, niter, iron and coal, though many of the mineral resources are still undeveloped. The trees of Asiatic Turkey are the cedar, cyprus, sycamore, mulberry, olive, fig, citron, orange and pomegranate. There are 250 species of birds and many wild animals. It is a rich country with great resources, but still undeveloped.

Government and Religion. On the abdication of Mohammed VI, thirtieth Sultan since the conquest of Constantinople (1453), tenth sultan of the house of Othman, and nominal leader through his power of appointment of the Mohammedan religion, Mustapha Kemal came into power. The Republic of Turkey now operates under a constitution passed in 1924. The constitution provides that the president shall be chosen from among the deputies of the assembly, that he shall be powerless to dissolve the body, that he shall hold office only during the term served by the deputies, and that he shall not be the military head of the government (as in the United States). Mustapha Kemal, the military leader of the "young Turks," and the one chiefly responsible for the modernization of Turkey, was elected president.

Only 5 per cent of the 220,000,000 Mohammedans in the world reside in Turkey, yet since 632 A. D., on the death of Mohammed, Turkey has named the caliph, or religious head of the Mohammedan Church. For many years the sultan of Turkey was also caliph. When Mohammed VI was deposed in 1922, Aga Khan III was chosen by the Turkish government at Angora to be the caliph. Khan remonstrated at his limitation of powers in 1923. As a result, the Turkish government deposed him, and since that time will recognize no caliph whatever.

Turkey for the Turks, with a modern republican form of government and a place in the sun for an Ottoman nation, expresses the spirit of present-day Turkey. At the close of the World War, Turkey was a broken remnant. But through the leadership of Mustapha Kemal the nation has recovered Constantinople, made Angora the capital, and instituted many reforms.

Education. The Koran and the Multeka encourage public education, so that public schools have long been established in most of the prominent towns, while colleges with public libraries are attached to the principal mosques. At Constantinople are the Great National school (Greek), founded in 1870, a university founded in 1900, an imperial art-school, law, military and engineering schools and a naval school on an island in the Sea of Marmora. The Christian communities have always maintained good institutions, among them Robert College at Constantinople and the Syrian Protestant College at Beirut.

History. The Ottoman empire is the successor of the Byzantine empire (*q. v.*), and was founded by Othman or Osman who conquered Nicaea and other districts, and succeeded to the power of the Seljuk sultans. Adrianople was taken in 1361 by his grandson. Mohammed II (*q. v.*) after a siege of 53 days took Constantinople and ended the Byzantine kingdom on May 29, 1453. Solyman the Magnificent (*q. v.*) followed closely the military plans of his predecessors and after many important conquests brought Turkey to its highest military power. During his son's reign the Turks lost the battle of Lepanto. Under his successors the Turkish power was reduced by such generals as Montecuculi, Sobieski and Prince Eugene. (See JOHN II OF POLAND and EUGENE). The loss of the Crimea and the regions north of the Black Sea, the conquest of Egypt by Bonaparte and its resulting war with France increased the troubles of the country. The revolt of the janizaries ended with a terrible struggle and massacre in 1826. At Navarino, Oct. 20, 1827, the Turkish fleet was destroyed, and in 1829 Greece became independent. Between 1840 and 1867, exclusive, Egypt (*q. v.*) became practically independent. It was not until 1840 that Turkey was admitted into the political system of European states, and since that time her power has been constantly strengthened by the alliance of other nations, as by England, France and Sardinia in 1854 in the Crimean War against Russia and by the French and English in the conflicts between the Druses and Maronites at Damascus and in the Lebanon (*q. v.*). In 1875 Bosnia (*q. v.*) and Herzegovina revolted against Turkish misrule, and a year later there were uprisings in Bulgaria (*q. v.*), followed by horrible massacres of men, women and children by Turkish soldiers. These atrocities aroused all Europe. On account of them England could not now befriend Turkey, and Russia, having secured the neutrality of Austria by giving her permission to occupy Bosnia and Herzegovina on certain conditions, declared war against Turkey in 1877. After a bloody contest, Plevna, the Turkish stronghold, fell, and the Russo-Turkish War was ended by the peace of 1878. This changed the map of European Turkey greatly, Rumania, Montenegro and Serbia becoming independent. Bulgaria north of the Balkans was erected into a principality under Turkish protection. A portion of Armenia, including Batum, was taken by Russia, and during the next two years there were horrible massacres of the Armenians left under Turkish rule. In 1896 a revolt of the Christians in Crete was followed by war with Greece, as a result of which the Greeks were forced to sue for peace. Crete, however, was put under the jurisdiction of a high commissioner representing the powers of Great Britain, France, Italy and Russia.

During the first years of the twentieth century the "Sick Man of Europe," as Turkey was popularly called, was apparently tottering to his grave. Then appeared on the scene the "Young Turks," a group of patriots, many of them graduates of the universities of western Europe. The Young Turk movement was the counterpart of the nationalist movement which had resulted in the creation of Serbia, Rumania and Greece. In 1908 Sultan Abdul Hamid II was compelled by the Young Turks, led by Enver Pasha, to restore parliamentary government, as provided in the constitution of 1876.

Austria took advantage of these disturbances and annexed Bosnia and Herzegovina, while Bulgaria announced its absolute independence. War with Italy in 1911-12 cost Turkey its African province of Tripoli, and the Balkan Wars cost most of its remaining territory in Europe. Finally came the World War, in which Turkey, its army and navy trained by German officers, became allies of the Central Powers. At the close of the war the Treaty of Sèvres was intended to end Turkish rule in Europe, but it rather apparently opened a new chapter, for most of the Turks refused to recognize the validity of the treaty, and organized a "nationalist" government at Angora, under the leadership of Mustapha Kemal. Power in Turkey soon passed from the sultan, Mohammed VI, at Constantinople, into the hands of the Kemalists. Meanwhile the Turks routed the Greeks, who had started a new war to enforce the Treaty of Sèvres, and in October, 1921, they signed a treaty of economic coöperation with France.

On October 29, 1923, the Republic of Turkey was proclaimed with the capital established at Angora (now called Ankara). Ghazi Mustapha Kemal was elected President, and Ismet Pasha, the Prime Minister. In 1924 the Turkish Caliphate was abolished. In 1928 the Constitution was amended, abolishing the state religion in Turkey. Polygamy was abandoned, divorce laws were established and women were admitted to public offices. The Mohammedan code of law was replaced by Swiss and Italian forms. The Gregorian calendar was adopted, and provision was made to introduce gradually the Western alphabet and numerals. The wearing of the fez was prohibited. In 1929 the compulsory education of all illiterate adults in the republic was undertaken.

The significant progress which has attended Republic of Turkey under its capable President, Mustapha Kemal, was marked by another great advance in 1934 when a system of State capitalism was introduced in the economic life of the nation. Since May, 1933, a commission of American experts under the leadership of General Walker D. Hines has been engaged in making an intensive study of the resources in Turkey and the possibilities for industrial development. The Turkish Government is neither communistic nor socialistic in policy yet its economic policy bears trace of Soviet influence. State monopolies made their initial appearance in Turkey more than a year ago. The tobacco, sugar, salt, and alcohol industries and the manufacture of explosives have since been controlled by an extensive system of monopolies. The Government also financed fifty per cent of the mining industry and railways. In the future the Government will play an important rôle in the industrial development of the nation. A program of social reform has also been instituted which will improve the status of the Turk.

The industrial Five-Year Plan designed by Mustapha Kemal was passed by the Grand National Assembly and its formal adoption announced early in 1934 by the Turkish Council of Ministers. In its accepted form the plan calls for the construction of fifteen factories, twelve of which will be State owned. The remaining three will be private enterprises. About 25,000,000 Turkish pounds (approximately $19,000,000) will have to be appropriated in the yearly budgets for this purpose. Soviet Russia has made available a credit of $12,000,000 for the purchase of machinery. The chief purpose of constructing these new factories is to supply the Republic of Turkey with manufactured articles which were formerly imported. Turkey has the raw materials for such manufactures within her own confines. The greater part of these factories will be constructed in Anatolia.

One of the unusual features of Turkey's plan for a successful carrying out of the Five-Year program is the new curfew law in the Republic. In January the Government issued an order under which the nation must retire at an early hour so that the people may get sufficient rest to create enough energy to carry Turkey through its Five-Year Plan. The Kemalist Government ordered all theatres closed at 11 P.M. All trolleys and ferries were under order to stop at 11:30 P.M. These regulations of the Government were to be enforced during the month of Ramazan. In this month of festivity Moslems fast all through the day, eating only in the hours between sunset and sunrise.

Another important reform in Turkey which was instituted in 1934 was the adoption of a metric system of weights and measures to be put into use throughout the Republic. The use of such a system will be a novel experience for Turkish peasants but one which they must accept and accustom themselves to as an additional step in the progress of united Turkey under Mustapha Kemal.

Turkey is swarming with Mahmuds, Mustaphas, Alis and Ahmets. Family names are rarely heard in modern Turkey. A move is now under way to require all Turks to adopt family names. Such a system would greatly facilitate the keeping of official records.

An extradition treaty with the United States was ratified by the United States Senate on February 5, 1934. It was deemed of especial importance at this time since the Insull affair was demanding the consideration of the Minister of the Interior, Kaya Bey, and Turkish authorities. Under the leadership of its distinguished President, Gazi Mustapha Kemal, the Republic of Turkey has resumed its place among world powers as an efficient government which aims at restoring and maintaining peace among foreign nations, especially in the Far East. The establishment of friendly relations with all its neighbors is one of the most admirable of Kemal Pasha's policies and one which enables the Republic to look towards prosperity in the future. The people of Turkey are beginning earnestly to heed the Gazi's exhortation, "Be proud to call yourselves Turks."

Turks, a race of people belonging to the Turanian family, who appeared first in Asia among the Tartar tribes. In the sixth century around Turkestan grew up a Turkish empire, which was overthrown by another Turkish tribe, the Uigurs, the first Turks to possess a written language. They were driven westward by the Chinese, with whom they had been contending for centuries, and their kingdom in Central Asia was entirely overthrown by Genghis Khan. They had already established themselves in the west of Asia, however, where the possessions of the Seljuks, another tribe of Turks, reached from Persia to India between the tenth and twelfth centuries. The Ottoman empire was founded in the fourteenth century by Othman, and the present inhabitants of Turkey are called Osmanli or Ottoman Turks. The Turkomans ("like the Turks") are the descendants of the old Seljuks, and are found in Turkestan. The Ottoman Turks, found in the Turkish empire, are more like Europeans than the other Turkish tribes, which have the broad face, high cheek-bones and yellow skin of the Mongolians. The different tribes speak nearly the same language, and usually are Mohammedans, although the Turks on the borders of China are Buddhists, and those of Siberia, Greek Christians.

See SELJUKS; TURANIANS.

Turks and Caicos (*kī'kōs*) **Islands,** a dependency under Jamaica, are two groups of British Islands situated southeast of the Bahamas, of which they are geographically a part. They number more than thirty, of which only eight are inhabited. These islands extend over an area of one hundred sixty-five and one half miles. Grand Caicos is the largest, being twenty-five miles in length and twelve miles broad. Grand Turk is seven miles long and two miles broad, and is the seat of the government. There is a Cable station at Grand Turk. The most important industry is salt raking. Other occupations include sponge and fibre industries. The principal exports are salt, sponges and dried fish. The government is under a Commissioner, assisted by a Legislative Board of seven members, all appointed by the Crown, and supervised by the Governor of Jamaica. There are eleven Government elementary schools in which education is free and compulsory. The population in 1931 was estimated at 5,300.

Turmeric (*tûr'mẽr-ĭk*), a name given to the roots of a plant of the ginger family. The roots or root-stocks are yellow, marked with wrinkles, and a darker yellow or reddish brown inside. When chewed, they produce a yellow stain. They have an odor like ginger, and have a somewhat similar taste. Turmeric roots are sometimes used in dyeing, in coloring varnishes and in curry-powder and pickles. Paper colored by turmeric is extensively used by chemists as a test for alkalies and for boric acid. Turmeric is grown chiefly in China, India, Java and Barbados.

Turner (*tûr'nẽr*), **Edward Raymond,** a noted American historian, was born in Baltimore, Maryland, in 1881. After completing his university education, Turner became an associate in history at Bryn Mawr College in 1910. In 1911 he became professor of European history at the University of Michigan, and occupied that post until 1924. In that year he accepted the chair of English history at Yale University, and in 1925 he became professor of European history at Johns Hopkins University. Turner died in 1929.

Turner, Frederick Jackson, an American educator and historian, was born at Portage, Wisconsin, in 1861. He was graduated from the University of Wisconsin in 1884, after which he pursued a graduate course in history at Johns Hopkins University. He was professor of American history in the University of Wisconsin until 1910, when he became professor of history at Harvard University until his retirement in 1924. His particular service in the field of history has been to promote appreciation of the importance of the settlement of the West in America. He died in 1932.

Turner, Joseph Mallord William, an English painter, was born at London on April 23, 1775. His first art-work was coloring prints for an engraver. He was indebted to a Dr. Monro for encouragement in his early work by giving him the opportunity to see his fine collection of water-colors and by buying his sketches. He studied at the Royal Academy, where he exhibited his pictures, and in 1802 was elected a member, being already recognized as the first landscape-painter of his time. His style was afterward changed by travel in Europe, and in the last few years of his life, as some physicians believe, by a change in his eyes, which cast the blue mist so characteristic of his later works. He contributed 259 pictures to the Royal Academy, and over 19,000 drawings and sketches were mounted and arranged by Ruskin. His illustrations of the poems of Rogers, Byron, Scott and other authors are well-known. Among his paintings are *Dutch Boats in a Gale*, *Falls of the Clyde*, *Sun Rising through a Mist*, *The Fighting Téméraire*, *Bay of Baiæ* and *Childe Harold or Modern Italy*. His most famous drawings are *Rivers of France*, *Rivers of England*, *Scenery of the Southern Coast* etc. They were carefully prepared by him for engraving, and all his pictures were engraved during his lifetime. Ruskin in *Modern Painters* did much to raise Turner to the high position he holds among English painters. He was very eccentric, traveling alone and hiding himself for months under an assumed name, and had a strong passion for money. He died on Dec. 19, 1851, at Chelsea, leaving to the nation his collection of pictures, which have been placed in the National Gallery of London. His large fortune was left to found a home for needy artists, but some defect in the will prevented the carrying out of his wishes. He was buried beside Sir Joshua Reynolds in St. Paul's. See *Life* by Thornbury; *Life* by Hamerton; and *Modern Painters* by Ruskin.

Turner, Sharon, an English historian, was born at London, Sept. 24, 1768. He was attorney by profession, but continued his literary studies, and published a *History of the Anglo-Saxons*, in three volumes. This work was the result of years of patient collection of materials and research, and gave its author a permanent place in English literature. His other works are a *History of England from the Earliest Period to the Death of Elizabeth* and a *Sacred History of the World as Displayed in the Creation*. He died at London, Feb. 13, 1847.

Turn-Verein (*tŏŏrn-fĕr-ine'*), from the German *turn* meaning gymnastics and *verein* meaning society, is a German society for gymnastic exercises, instituted in 1811 by Friedrich Ludwig Jahn, known as *Turnvater Jahn*. Jahn realized the important influence of gymnastics upon health and physical fitness, especially in the training of soldiers; and, being a soldier himself and inordinately fired with the spirit of war and patriotism, he conceived the idea of forming a society which should prepare German youth physically for excellent citizenship. In 1811 a sand-field was secured near Berlin, the edge of what now is the great exercising-ground of the Berlin garrison. Here began the gymnastic exercises which now form part of the curriculum in every German school. A monument of Jahn has been erected here, the stones of which were sent from far-away countries. Knowing the German fondness for song, Jahn sought to establish an intimate relation between singing in unison and outdoor exercises. Singing was then made a part of the gymnastic exercises on the march to and from the field, and Jahn took great pains to select patriotic and military songs. On this gymnastic field he was training the minute-men of the German Revolution. The *turn-verein* now is a great factor in German education. A university union was founded in Berlin in 1860; and was immediately imitated by other universities. An association of such unions was founded in 1872. The two great associations of *turn-vereine* in Germany include respectively 26 universities (the older including Berlin, Leipzig and Gratz), and 16 universities and high schools (including Jena, Freiburg, München and Aachen.)

Tur'pentine, a gum or resin which is found in various species of pine, and some other trees. American or common turpentine is obtained from the long-leaved pine, and is brought in the largest quantities from North Carolina. Venice turpentine, which is considered the best kind, is from the larch-tree. German turpentine comes from the Scotch fir, Strassburg turpentine from the silver fir and Canada turpentine from the balsam or balm-of-Gilead fir. Turpentine is obtained by making a cut in the tree and catching the sap, which looks much like honey. The oil of turpentine is made from this sap by distilling, and the hard part that is left is the common yellow resin, used in making soap, etc. Turpentine hardens in the air, burns easily, and can be dissolved by alcohol or ether. The oil of turpentine is used in medicine and in making varnishes and paints. The name comes from the terebinth tree, from which the Greeks obtained it. See Resin.

Turquoise (*tur-koiz'*), one of the precious stones, is a mineral, found mostly in Persia. It is a phosphate of alumina colored by copper. It is hard and of a greenish-blue color, the finest blue being the most valuable. It is used in the east for ornamenting swords, charms and girdles, and is thought to protect its owner against disease. The finest specimens are supposed to belong to the shah of Persia, as only inferior varieties are allowed to be sent out of the kingdom.

Turtle, a general name of all reptiles having the body inclosed between an upper shield (*carapax*) and a lower shield (*plastron*)

Names like tortoise and terrapin apply to particular kinds of turtles, but the general name embraces the green turtle, famous for making soups, the loggerhead turtle, soft-shelled turtle, snapping-turtle, pond-turtle, terrapin, tortoise and others. They inhabit both fresh and salt water, and some forms are terrestrial. Many kinds are sought for food.

Unlike tortoises and terrapins which have feet adapted for walking on land, the true turtles or sea-turtles have their limbs in the form of flippers or paddles, suited to their aquatic life and enabling them to swim with great swiftness. Their bodies also are so depressed or flattened as to facilitate their progress through the water. The head is so placed upon the neck as to permit the nostrils to be raised above the surface of the water for breathing, and the nostrils can be closed by a fleshy valve. The turtles live in the sea and come to the shore only for breeding. Their eggs are soft, differing in this respect from those of the tortoise and terrapin. The best known species is the green turtle, famous as the source of the turtle-soup so widely prized. It is a vegetarian, feeding upon seaweed. It reaches a length of 42 inches and its shell is olive or brown with yellowish spots. The hawksbill-turtle feeds upon animal substances and is not itself used for food, but is prized for the mottled shields of its shell which furnish the tortoise-shell of commerce. The loggerhead-turtle is known by its enormous head and hooked beak. It is the largest species, and readily crushes a conch-shell in its strong beak.

Turtles never leave the sea except to lay eggs. They scramble along clumsily, and if turned on their backs they are helpless. Turtles generally come ashore on moonlight nights and often utter a loud hissing noise. Audubon writes that when the female turtle is once landed she "proceeds to form a hole in the sand by removing it from under her body with her hind flippers. The hole is dug to the depth of 18 inches or two feet. The eggs are then dropped one by one and disposed in regular layers to the number of 150 or sometimes nearly 200. She now scratches back the loose sand and so levels and smoothes the surface that few persons on seeing the spot could imagine that anything had been done to it. This accomplished to her mind, she retreats to the water with all possible dispatch, leaving the hatching of the eggs to the heat of the sand." The eggs of turtles are prized as food. Large numbers of turtles are caught by turning them on their backs when on land. Sometimes they are harpooned; sometimes they are pursued in shallow water by men in canoe or boat, and when overtaken, a man springs upon the turtle's back and clings to it until it is tired out and secured.

Turtledove, an Old-World dove represented by 25 or 30 species. The common turtledove, so abundant in Europe, is both wild and tamed. It is noted for its affectionate and peaceful disposition. It is a migratory pigeon of moderate size. Like other members of the group, it feeds on seeds and various kinds of grain and makes a platform of twigs as a nest. The mourning dove of the United States is also called the turtledove. It belongs, however, to a different genus from the European dove. It is about 13 inches long, including its long tail. It is brownish olive, glossed with blue and wine colors. The plumage shows metallic reflections. It feeds upon the ground. This bird is widely known, on account of its long mournful note, even to those who have not seen it. See DOVE and PIGEON.

Tuscaloo'sa, Ala., county-seat of Tuscaloosa County, is on Black Warrior River, 90 miles northwest of Montgomery. The insane asylum, with fine buildings and grounds, a college for women and the state university are situated here. The university's endowment includes 500 acres and $300,000 from lands granted by Congress. The buildings were burned in 1865 by the Federal troops, but there are four new buildings, with Clark Hall, containing the library. Tuscaloosa is in the cotton-planting and the mineral region of Alabama, which makes it the center of a large trade. It has flour-mills, cotton, shoe and leather factories. The name comes from the Indian chief, Tuscaloosa (Black Warrior), who fought with De Soto. Population 15,000.

Tus'cany, a division of central Italy, formerly a grand-duchy. It lies south and west of the Apennines, on the Mediterranean, covering 9,304 square miles. The northern part is mountainous, the remainder hilly and undulating, except the coasts, which are flat and marshy. The principal rivers are the Arno, Cecina and Ambrone, which flow into the Mediterranean. The main crops are corn, wheat, rye and barley; cattle, sheep and mules are raised in great numbers; olive-oil, wine, woolen, silk and straw-goods are manufactured. Leghorn is the principal seaport, and Florence (*q. v.*), the chief city, for centuries was the center of Italian literature and art, and is famous for the beauty of its situation and environs and for its fine art-collections. Tuscany was a part of ancient Etruria (*q. v.*). With the fall of the Roman empire it went to the Lombards, and was governed by counts, under Charlemagne and other emperors, until the latter part of the 12th century. Florence, Pisa, Siena and Lucca were the principal of the little states into which Tuscany was divided during the struggles of the next centuries. Modern Tuscany was formed in 1569, when Cosimo de Medici became grand-duke of Tuscany. Napoleon formed the kingdom of Etruria in 1801, and in 1808 made his sister, Elisa, grand-duchess of Tuscany. In 1860 it became a part of the kingdom of Italy. Population 2,694,453. See *Tuscany* by Mrs. Trollope.

Tus'caro'ras, a tribe of American Indians, one of the Six Nations of the Iroquois family, found in North Carolina at its settlement. After difficulties with the whites, in which many of the Indians were killed or taken prisoners, a part of the tribe fled to New York, where they settled on Lake Oneida, and still have a reservation in that state. In 1829 North Carolina bought the lands still held in that state by the Tuscaroras. The name means a shirt-wearer.

Tweed, the most famous river in Scotland, rises in Peebleshire, flows for about 20 miles northeast and then in an easterly direction, emptying into the North Sea at Berwick in England. It is 95 miles long, but navigable only a few miles from its mouth. It owes its fame to beautiful scenery and historical associations. Crossing the heart of the Borders between England and Scotland, it has been the scene of many a deadly struggle, and its name is frequent in ballad and story.

Tweed, William Marcy, an American politician, was born at New York, April 3, 1823. He held the different offices of alderman, congressman, supervisor of the city of New York, school and street commissioner and state senator. While commissioner of public works in 1870, he and his followers, constituting the famous Tweed Ring, used large amounts of public funds for their own purposes. After several trials Tweed was convicted of fraud and sentenced to 12 years' imprisonment and the payment of $12,550 as a fine. He was confined at Blackwell's Island, but his imprisonment was declared illegal by the court of appeals. Several other suits had been brought against him, and he was again imprisoned for want of the $3,000,000 of bail required. He escaped to Spain, but was recaptured, and died in jail in New York City on April 12, 1878.

Twee'die, Hon. L. J., was born at Chatham, New Brunswick, in 1849. Called to the bar in 1871 and elected to the legislature in 1874, he was surveyor-general in 1890, and became provincial secretary in the Mitchell administration and in the Emerson government. He became premier and provincial secretary in 1900, and was appointed lieutenant-governor of New Brunswick in 1907.

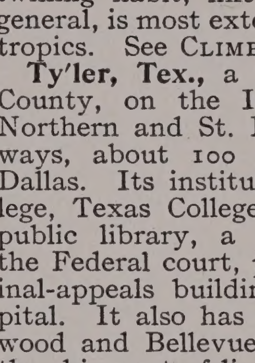
Twickenham (*twĭk'en-am*), a village in Middlesex, England, on the Thames opposite Richmond. It is known as the residence of Pope, whose grotto is still to be seen and whose monument is in the parish church. Strawberry Hill, famous as the home of Walpole, is near by, and the Orleans house, used by Louis Philippe while in England and still belonging to his family, is in the town. Population 20,991.

Twi'light is the faint light before sunrise and after sunset, which is produced by the reflection by the atmosphere of the sun's rays when it is still below the horizon. If we had no atmosphere, we should have no light until the exact moment when the sun would rise and no light after the sun had set. The sun must be approximately 18° below the horizon at any place before the twilight will entirely cease; so in the polar region where the sun is nearer the horizon than 18° there will be twilight all night, or rather there will be no complete night. Just what there is in the earth's atmosphere that reflects the sunlight is yet unknown. It may be dust-particles; it may be minute crystals of ice; it may be pure air itself.

Twi'ner, a plant which climbs by coiling its body in an ascending spiral about a support, as the morning-glory or the hop-vine. In their younger parts twiners are sensitive to contact, so that when they touch a support they curve sharply about it. The twining habit, like the climbing habit in general, is most extensively developed in the tropics. See CLIMBING-PLANTS.

Ty'ler, Tex., a town, the seat of Smith County, on the International and Great Northern and St. Louis Southwestern railways, about 100 miles east-southeast of Dallas. Its institutions include Tyler College, Texas College (for colored youth), a public library, a conservatory of music, the Federal court, postoffice, court of criminal-appeals buildings and a railroad hospital. It also has two public parks (Lakewood and Bellevue). Its trade consists in the shipment of live stock, cotton, hay and varied kinds of fruit and vegetables. It has cotton-gins, brick-kilns, a pottery, cottonseed-oil mills, a fruit-and-vegetable and a box-and-crate factory. The town was settled in 1846, incorporated the same year, and received its present charter in 1875. Population 15,000.

Tyler, John, tenth president of the United States, was born at Greenway, Charles City County, Va., March 29, 1790. He graduated at William and Mary College in 1807, studied law, and had a large practice soon after he was admitted to the bar. He was elected five times to the state legislature and three times to Congress. He sympathized with the states' rights party, and opposed the United States bank, protection and all limitations of slavery. In 1825 he was chosen governor of Virginia, and in 1827 he became United States senator and was again elected in 1833. From this time he acted with the Whig party,



JOHN TYLER

being an active partisan of Henry Clay, and in 1840 was by that party elected vice-president of the United States, with General Harrison as president. The death of President Harrison, a month after his inauguration, made Tyler president in 1841. His administration, at first favorable to the Whigs, was soon displeasing to them. He vetoed the bill for a United States Bank, at that time a favorite project of the party. Several members of the cabinet resigned, and finally John C. Calhoun, the great Democratic statesman, was made secretary of state. The annexation of Texas in 1845 and the passing of a protective tariff law in 1842 were among the important acts of Tyler's administration. In 1861 he was president of the peace convention which met at Washington to effect a compromise between the north and the south. He afterwards joined the Confederate cause, and was a member of the Confederate Congress at his death, which occurred at Richmond, Va., Jan. 17, 1862.

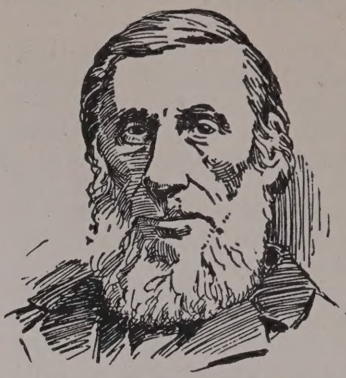
Tyler, Moses Coit, an American *littèrateur* and professor of American history at Cornell University since 1881, was born at Griswold, Conn., Aug. 2, 1835, and graduated at Yale in 1853. From 1867 to 1881 he was professor of English at the University of Michigan, and for a time was literary editor of *The Christian Union.* In 1881 he accepted the chair of American history at Cornell. He wrote a *Manual of English Literature*, a *History of American Literature during the Colonial Period (1606-1765)*, *The Literary History of the American Revolution*, *Glimpses of England* and a *Life of Patrick Henry*. His works possess literary charm as well as thorough scholarship. He died on Dec. 28, 1900.

Tyler, William Seymour, an American scholar, was born at Hartford, Penn., Sept. 2, 1810. The gift of a Greek grammar by a young minister started the boy on his career as a scholar and teacher. He graduated at Amherst College, and studied theology, but accepted the professorship of Latin and Greek in Amherst College in 1836. Besides his work in the college for more than 50 years, where he became celebrated as a teacher of languages, he is well-known from his editions of Greek authors, as *The Germania and Agricola* of Tacitus, Plato's *Apology* and *Crito* and Demosthenes' *De Corona;* and from *The Theology of the Greek Poets* and *The History of Amherst College*.

Tylor, Edward B., D. C. L., a distinguished English scholar, and professor of anthropology at the University of Oxford, was born at London, Oct. 2, 1832, and educated at the Friends' School, Grove House, Twickenham. In 1856 he took a scientific journey through Mexico, and has written *Anahuac*, *Mexico and the Mexicans; Researches into the Early History of Mankind; Primitive Culture;* and *Anthropology*.

Tyndale, William. See TINDALE, WILLIAM.

Tyn'dall, John, an eminent British scientist, was born at Leighlin Bridge, Carlow, Ireland, Aug. 21, 1820; and died in Surrey, England, Dec. 4, 1893. He was educated in the public schools until 19, when he entered the employ of the ordnance survey. After a short teaching experience he went to the University of Marburg in 1848, where he spent two years and took his doctor's degree. In 1851 he went to Berlin, where he made the valuable acquaintance of Magnus, Clausius, Wiedemann and others. Returning to London in 1852, he was elected fellow of the Royal Society, and in the year following was appointed professor of natural philosophy in the Royal Institution, succeeding Faraday, a position which he held until 1887, when he was succeeded by Lord Rayleigh. Tyndall's earliest investigations were made at Marburg on *The Magneto-Optic Properties of Crystals.* In 1859 he began an important study of *Radiant Heat*, resulting in a classical volume in 1872. His investigations of glacier motion were reported to the Royal Society in 1856, and later recorded in interesting popular volumes. As a skillful and brilliant lecturer on science he has, perhaps, never been surpassed. Every one should read his *Heat as a Mode of Motion* and his *Forms of Water*.

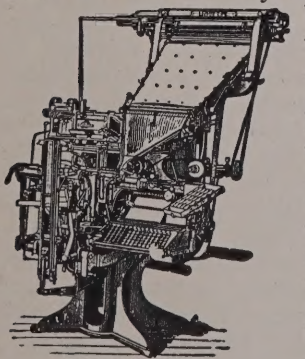

PROFESSOR TYNDALL

Tyng, Stephen Higginson, an American clergyman, was born at Newburyport, Mass., March 1, 1800. He was a graduate of Harvard College and a prominent clergyman of the Episcopal church, successively occupying parishes at Georgetown, D. C., Philadelphia and New York City. Besides his great influence in the pulpit and in church work, he was editor for some time of the *Episcopal Recorder* and *Protestant Churchman*, and wrote *Lectures on the Law and the Gospel; Christ Is All; The Captive Orphan; Esther, Queen of Persia; The Prayer-Book Illustrated by the Bible; Forty Years' Experience in Sunday-Schools;* and *The Feast Enjoyed.* He died on Sept. 4, 1885.

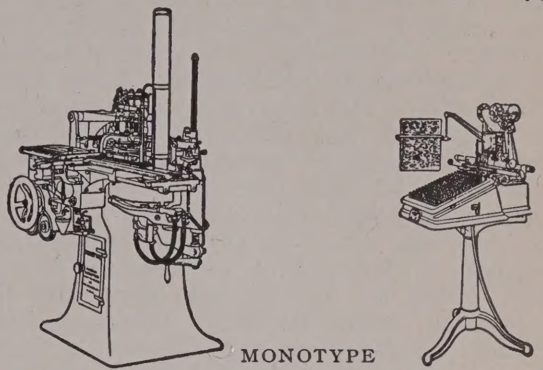
Type, the name of the metal letters used in printing. They are usually made of an alloy called type-metal, made of lead, antimony and tin, copper sometimes being added. The antimony gives hardness and the tin toughness to the soft lead, which is the principal metal used. A copper-face is sometimes put on the type by the electrotype battery, which makes it last longer. Types were formerly made by hand, but now type-casting machines do the work.

The types must be made with absolute accuracy in order to fit so exactly when placed together that they will form a solid body. To do this they are made in molds, into which the hot metal is injected. The letter to be made is cut on the end of a bar of soft steel, and then pressed into a piece of copper by the blow of a hammer, and the copper impression is fitted into the end of the mold and the metal poured in it, filling up the impression of the letter and the rest of the mold. Types are all of the same height, but of different widths according to the letter. A full set of types is called a font or fount, and has the letters in different proportions, as 60 of e, 45 of t and 40 of a, i, o, u etc. Large and small capitals, large and small italics, small letters, figures and punctuation-marks are found in a font. Types are of different sizes, called by printers nonpareil or six-point, minion or seven-point, brevier or eight-point, bourgeois or nine-point, long primer or ten-point, pica or twelve-point etc. Some of the names came from the first maker of the type, and others from the first book printed with that particular kind of type, as brevier from breviary and pica from the service of the mass called pica or pic. According to an inscription on a tablet to his memory in Mainz, Gutenberg is credited with making the first printing-letters in brass, in place of the wooden types first used in printing. The first type-founder in America was Christopher Saur, who cast the type used by him in printing a German Bible about 1735. A page of a daily newspaper will sometimes require 150,000 types.

Type'setting-Machines. The closing years of the last century contributed much to the development and advancement of the art of printing. To substitute machines for the slow, laborious and expensive process of typesetting by hand had been the aim and ambition of a number of inventors. The United States patent-office alone has recorded upwards of 500 patents for typesetting and distributing machines with improvements; but the majority of these inventions have been noted more for their ingenuity than their practical use. Nearly all of the typesetting-machines were invented with the object of using the regular hand-type. A few machines of this class are still in use in America and England. Two of the most successful machines are the linotype and the monotype, both machines making their own type. The linotype (*q.v.*) was constructed by Otto Mergenthaler of Baltimore, Md., and is largely used by the daily newspapers throughout the world. This machine casts a solid line of type (*q. v.*) from a group of matrices or molds that bear the impress of the letters. These are dislodged from their respective channel receptacles at the top of the machine and assembled by the operator in the form of words spaced out to the desired length of line; the operator simply fingering a keyboard, somewhat as in the typewriter. The monotype was invented by Albert Lanston of Washington, D. C. This machine casts each type and space separately, but in lines of words spaced out to the length of line desired. This is accomplished by a machine called the caster, the mechanism of which is regulated by a long strip of paper previously perforated by the operator on the keyboard. The production of the monotype being movable types, the machine is largely used in book-work and job-work, as the matter is practically the same as type set by hand and can be manipulated as such. The linotype and monotype machines have been improved so greatly in recent years that any kind of printed matter can be handled by them as well as or better than by hand; certainly much more rapidly.



LINOTYPE



MONOTYPE CASTER AND KEYBOARD

In combination with the improvements and inventions in other branches of the printing-trade, as printing-presses, folding-machines and bookbinding-machinery, the use of typesetting-machines has enabled the manufacturer to reduce the price of all classes of printed books and magazines, thus bringing literature of every description within the reach of all.

Perhaps there is no trade or profession that is a better example of the vast advantages accruing to mankind from the usefulness and utility of labor-saving machinery and new inventions. Instead of displacing the workmen, the tendency in the printing-trade has been to increase the number with every new device invented. To-day there are more men and women employed in the manufacture of printed matter than ever before, irrespective of the great number employed in making machinery for their use. W. H. Aitken.

Type'writers, machines for writing by movable types instead of the pen. In 1714 a patent was granted in England for a writing-machine, and one was invented in France about 1784. The first writing-machine patented in America was the Thurber in 1843, which worked too slowly to be of general use. Other machines followed, each introducing improvements and new principles, until in 1873 the Remington was put into practical use. It was the result of experiments made by two printers, Sholes and Souli, whose attention was called to an article in *The Scientific American* describing a writing-machine which had been invented by John Pratt of Alabama. The first machine was finished in 1867, and was used for letter-writing. One of these letters brought the new enterprise a friend, Mr. Densmore of Pennsylvania, who joined with Sholes in perfecting the machine, until in 1873 it passed into the hands of the firm of Remington and Sons, Ilion, N. Y. It was first used by professional men. Its great advantages for business houses were not thought of until 1882, since which time it has been almost universally adopted, and many different kinds have been introduced. The types are placed on arms or bars of steel, each marked with a letter, which are moved by the fingers of the operator as are the notes of a piano. The paper is carried through by rollers, and moved one space with each impression of a letter. The use of the typewriter instead of the pen is estimated to save 40 minutes an hour or over five hours in a day. It will write 13 *letters* a second, some operators writing more than a hundred *words* a minute. Typewriting has become a profession, and there are free classes of instruction in many public institutions in the United States.

Typhoon. See STORMS.

Tyre (*tīr*), a city of ancient Phœnicia, on the Mediterranean. There were two towns of Tyre, one on the mainland of modern Syria and the other on an island opposite. It was in a fertile region, with magnificent scenery, and was a rich city in the days of Solomon, when Hiram, its king, furnished him with cedar-trees, fir-trees and gold. It was a naval city at that time also, as it is recorded that Hiram sent to Solomon "shipmen that had knowledge of the sea," and its harbors were among the finest of the period. Carthage (*q. v.*) was founded by the people of Tyre about 813 B. C., the new colony seeming to have so weakened the old city that it disappeared from history until Shalmaneser (or Sargon according to some writers), king of Assyria, conquered it after a long siege, and Nebuchadrezzar after a 13 years' siege by water and by land reduced it only to partial submission, leaving its ruler on the throne and its wealth untouched. The city fell before Alexander the Great in 332 B. C., who put in a new colony, under whom the city soon regained its prosperity. When under the Roman power, Tyre was given to Cleopatra by Antony. In the 7th century it came into the hands of the Saracens, until taken by the crusaders. Its wealth, made by its trade and manufactures, especially that of the renowned Tyrian purple dye, made it a prosperous city until 1516, when the newly discovered route to Asia by the Cape of Good Hope ended its commerce. Its site is occupied by an unimportant town called Sur, with about 5,000 inhabitants, under the Turkish government of Beirût. Many of the ruins of ancient Tyre have been covered by the sea, but tombs are found cut in the rocks and the remains of a Christian cathedral built in 324.

Tyrol or **Tirol** (*tē̇-rōl′*), an Austrian province in the western part of the empire, lies north of Italy and east of Switzerland. It covers 11,324 square miles, and is divided into three large valleys separated by mountain ranges — the Tirolese or German Alps on the north, the Rhœtian Alps in the center and the Trent Alps on the south. The loftiest peaks in Austria (*q. v.*), many of them in the region of perpetual snow, are in the Tirol. Brenner Pass, the lowest of the great passes of the Alps, is near the center of the province and on the line of travel between Italy and Germany. The Inn, the Adige and the Rhine on its borders are the principal rivers. About one third of the land can be cultivated, the rest being in forest or in the area of snows. The crops are corn, other grains and fruit. Goats and sheep are raised, and chamois, marmots and eagles abound. Gold, iron, copper and coal are found. There is a university at Innsbruck and other schools in the country. The people are divided into the German Tirolese in the north and the Italian Tirolese in the south, and nearly all are Roman Catholics. They are very patriotic, and are noted for their love of home and their national songs.

Tirol under the Romans was a part of Rhætia. It passed back and forth from Bavaria to Austria until 1814, when Austria finally claimed it. In 1809 the insurrection under Andreas Hofer took place, in which men and women fought side by side until hundreds were killed, because their country had been given to Bavaria. Population, 981,949. Consult *Tyrol and the Tyrolese* by Grohman and *The Valleys of Tyrol* by Busk.

Tzarsko-Selo or **Sofia**, a town in Russia, 15 miles south of Petrograd. It was the summer residence of the czar, and originally was a country-house of Peter the Great. The palace was built in 1744. The main building is 800 feet long, with large wings in addition. The rooms are magnificent, finished in gold, amber, *lapis lazuli* and other precious materials. There are a Gothic castle, an arsenal and a smaller palace, built by Alexander I. Population, 55,186.

U

U (ōō), the twenty-first letter, is a vowel, sometimes a semivowel. It is a rounded *v*, both being formerly used both as vowel and as consonant. Not till nearly 1700 was *V* restricted to expressing the consonant. The sound is produced by rounding the lips and raising the back of the tongue, and so *u* is called a labial vowel. The true primary sounds were the long *u* (*ūse*), as in *tool*, and the short *u* (*bŭll*), as in *wood*. *U* also has the sounds heard in *actuate*, *rural*, *fulfill*, *urn*, *up* and *submit*, the variations being due to the accent not falling on *u*. *U* is silent in *antique*, *gauge*, *rogue*. After *g* and *q*, *u* is a *W*, as in *guano*, *queen* and also in *suite*.

Uganda (*ōō-gȧn′dȧ*), a British inland protectorate in East Africa, covering the region about the equatorial lakes, Victoria, Albert, Albert Edward, Rudolf and Kioga. The area is estimated at 223,500 square miles, with a native population of about 3,000,000, of whom a third belong to the civilized and Christianized Baganda, speaking a Bantu tongue. They are a miracle of missions, the Anglicans having 250,000 adherents, the Roman Catholics 146,000. Trade is in the hands of European and British trading-firms, and is also carried on by British Indians, Persians and Arabs. The region is fertile, except in Rudolf, the northeastern province, with a rich fauna and flora; while iron, copper and even gold abound. Experiments are being made in growing arrowroot, coffee, cotton and rubber. The Ugandan government railroad extends 750 miles from the coast to Lake Victoria. The protectorate is divided for administrative purposes into five provinces, (Rudolf, Nile, Central, Uganda and Western), over which order is maintained by a force consisting of Sudanese, Uganda Rifles, an armed constabulary and native levies to the number, in all, of 4,000 men. The territory came under British influence in 1890, and four years later it was erected into a British protectorate.

Uhland (*ōō′länt*), **Johann Ludwig,** a German poet, was born at Tübingen in Württemberg, April 26, 1787. He studied and practiced law at Tübingen, was a professor of the German language and literature in the university, a leader in the *diet* and a member of the Frankfort parliament. His writings consist of the dramas entitled *Ernest of Swabia* and *Louis the Bavarian*, works upon early German and Norse literature and mythology and the songs and ballads for which he is famous. The first collection of poems, made in 1815, were patriotic songs, called forth by the war against Napoleon, and more than 50 editions have been published. *The Castle by the Sea* and *The Black Knight*, found among Longfellow's poems, are translations from Uhland, and there have been various translations of his songs and ballads. He died at Tübingen, Nov. 13, 1862.

Uhlans (*ū′lăns*), the light cavalry of the Tartars, who were brought into Euorpe by their colonies in Poland. They were mounted on Tartar horses, and carried only light arms, as the saber, lance and, later, pistols. In the Prussian army all the light cavalry were called uhlans, and in their practices they fully lined up to the savage traditions of their chosen name.

Ulm, a city of Württemberg, is on the Danube River, 45 miles southeast of Stuttgart. It has one of the largest Protestant churches in Germany, one of the earliest libraries, with a remarkable collection of antiquities, and strong fortifications. Its pipe-bowls are noted and, with fine flour, make a large part of its trade.

Ulysses (*ū̇-lĭs′sēz*) or **Odysseus** (*ō-dĭs′-sōōs*), a Greek hero. He was ruler of Ithaca, and feigned insanity to avoid taking part in the siege of Troy (*q. v.*). To show that he was crazy he plowed the sand on the seashore, but Palamedes exposed his deception by placing his infant son in the furrow, when he quickly turned the plowshare aside. Unsuccessful in his mission to demand the return of Helen, he joined in the ten years' siege, being one of the most prominent of the Greek leaders. He fought with Ajax for the prize of Achilles' armor, which he gained, and was one of the Greeks hid in the wooden horse, who captured the city. On the island of the Cyclops, when six of his companions were eaten by the giant, he put out the giant's one eye, and escaped by tying himself and his companions under the bodies of the sheep, which carried the men with them when let loose from the cave. At the island of Æolus that god gave Ulysses a bag containing the favorable winds, but the bag was opened by his followers, and, the winds escaping, the ships were driven back to the island. Circe the sorceress changed part of his followers into swine, but he overcame her spells with the help of Hermes. He passed the island of the Sirens safely by filling the ears of his followers with wax and tying himself to the mast. At Trinacria his followers, while he slept, killed some of the cattle of Helios, which they had been warned not to touch, whereupon a great storm arose, the ship was wrecked, and all on board were drowned but Ulysses. He lived seven years on the island of Ogygia with the nymph Calypso, returned at last to Ithaca after 20 years of absence, and slew the suitors of Penelope, his wife, with the help of Athené and of Telemachus, his son. *The Odyssey* gives the story of his wanderings.

Um'bria, a country of ancient Italy, between the Adriatic Sea and Etruria or Tuscany. The Tiber and the Rubicon were among the principal rivers. It was one of the most powerful states in central Italy, but was conquered by the Romans in 308 B. C. The region is comprised in modern Perugia, a province of the kingdom of Italy. The area is 3,748 square miles, the population 685,042.

Un'alas'ka, one of the Aleutian Islands, the extension seaward of the Alaskan peninsula, which separates the Pacific Ocean from Bering Sea. The island lies at the passageway for steamers from San Francisco, Portland, Ore., and Victoria, B. C., proceeding to St. Michaels, the mouths of the Yukon and to Cape Nome. The chief village adjoins Dutch Harbor, and is named Unalaska.

Un'cas, an Indian chief of the Mohican tribe in Connecticut. The Mohicans (*q. v.*) were a band collected by Uncas after he had left the Pequot tribe, to which he belonged. He sided with the English in the war against the Pequots, and was so friendly with them that the Indians turned against him. In the wars which took place Uncas captured and killed the chief of the Narragansetts. Several tribes made war against him, and the Narragansetts would have starved him out of his stronghold had not the English sent him supplies by night. He was called a cruel and wicked man, but was faithful to his English allies. He died, very old, in 1682.

Uncle Sam, a nickname for the American nation, is a playful extension of the initials U. S. for United States. It corresponds to "John Bull," the nickname of England, as an attempt to personify a nation. It is said that the term originated in a jest made at Troy, N. Y., in 1812. An inquirer was told that the initials U. S., which occurred on certain goods purchased for the government stood for Uncle Sam, of Samuel Wilson, a citizen of Troy. It is doubtful whether there is any truth in this story. Certainly, however, 'Uncle Sam" was an accepted sobriquet for the United States as early as 1817. Uncle Sam is conventionally portrayed as a tall man, thin, with long, narrow beard, long-tailed coat and high hat.

Un'derground' Rail'road', the name popularly applied to the system adopted by many persons in the north, before the Civil War, for aiding fugitive slaves to escape from their masters into Canada, beyond the reach of the fugitive-slave law. Sympathizing abolitionists furnished the fugitives with food, hiding-places, transportation and advice, while they refused information or comfort to their pursuers. The most favored routes lay through Ohio and Pennsylvania. The houses along these routes where aid was given came to be known as "stations"; those persons directly assisting the run-a-ways as "conductors"; those who made contributions of clothing and money as "stockholders" in the enterprise. Wm. Lloyd Garrison and Wendell Phillips were stockholders. Among the most active officials was Levi Coffin, who claimed to have actively engaged in the work for 33 years and to have received an average of 100 fugitives annually; he was often styled the president of the concern. Seibert in his exhaustive work on "The Underground Railroad" gives the names of 3,211 "agents, station-keepers and conductors." Many of them were heavily fined for violation of the law, but the practice continued to be one of the chief grievances of the south against the north.

Underwood, Oscar, W. Chairman of the Committee which drafted the 1913 tariff (*q. v.*), was born in Louisville, Ky., May 6, 1862, graduated from Virginia University, was admitted to the Bar in 1884 and practiced at Birmingham until his election to Congress in 1895. Although coming to opposite conclusions with regard to the tariff, Mr. Underwood, like Mr. McKinley, has made it a life study. In the preparation of the 1913 tariff he had the great advantage of practical business experience. This enabled him not only to analyze clearly a measure so vitally related to our business life, but to present it in clear terms to his colleagues and to the country at large. While not an orator in the popular sense, Mr. Underwood may be well said to be an orator in the true and practical sense which has been well defined to be the power to bring people to your way of thinking. Underwood was first elected to the House of Representatives for the term 1915–17, and served continuously until his election to the Senate for the term 1915–22; he was re-elected for the term 1922–27. In 1912 he was one of the leading candidates for the Democratic nomination for president. In 1920 he became the Democratic leader in the Senate, and in the next year was one of the American delegates to the Limitation of Armaments Conference at Washington, D. C. He continued to make his home in Birmingham.

U'nicorn, a legendary animal described by ancient authors as possessing the body of a horse and a single long horn, issuing from the forehead and projecting forward. It was supposed to inhabit India. This fabulous creature became a sign in heraldry. A somewhat similar animal with the cloven hoof and the beard of a goat is depicted on the coat-of-arms of England. The word translated *unicorn* in the Bible refers to some horned creature. It is supposed by some scholars that the buffalo is indicated.

U'niforms of the U. S.: Military and Naval. Of recent years, particularly since 1902, considerable changes have been made in the uniforms both of the army and the navy of the United States regular and volunteer forces. These have been introduced with the design of adapting them more effectively to the conditions of active service and to combine an ornamental and tasteful neatness with the idea of utility, but without undue display or ostentation. In accomplishing the changes the cumbrous helmet has been almost entirely discarded for a serviceable peaked cap (blue or khaki), retaining also the soft, felt, buff-colored campaign hat; while khaki, of a now fast dye, has been adopted as the uniforms for both officers and privates in the field, and white has been retained as the working dress of soldiers in addition to officers in the navy. The regulation uniform in the United States Army for all dress occasions is blue for tunics or sacks, with a blue of a lighter shade for the trousers; the khaki is of the same shade both for tunics and pants; while the prevailing color of the naval uniform (outside of white) is a dark blue, alike for tunics, frocks and trousers. The bandman's dress in the navy is the red tunic, with light-blue trousers, and helmet.

For general and field officers (army) the full-dress coat is the double-breasted frock, with a double row of buttons, with epaulets for general officers and shoulder-straps for inferior ranks.

The general officers wear a stripe of gold color, in full dress, down the trouser-leg; while the full-dress frock is adorned with a breast-cord and tassel of the corps, color of the department or arm of the service to which its bearer belongs. In the navy, on all but the white uniforms, the rank of an officer is indicated by gold-lace on the sleeve and devices on the collar, epaulet and shoulder-strap. Stripes of gold-lace of varying widths mark the rank on the sleeve of the officer from ensign to admiral; while all officers of the line or executive branch wear a gold star on the sleeve above the gold-lace.

The insignia of army officers, which are shown in the accompanying illustration, are worn on each shoulder with the same device in miniature on the right of the shirt collar. Field and line officers wear gold and black hat cords on campaign hats; general officers wear gold hat cords. All enlisted men (privates and non-commissioned officers) wear hat cords of various colors, each color signifying the branch of service to which the wearer belongs: that is, infantry, light blue; cavalry, yellow; artillery, scarlet; engineer corps, scarlet and white, etc. Rank is designated by a chevron on each sleeve.

Union of South Africa, self-governing dominion and member of the British Empire, occupying the southern end of Africa. The area, 473,954 square miles, is about four times that of the British isles. Established in 1909, the Union consists of Transvaal, Natal, Orange Free State, and Cape of Good Hope. The Witwatersrand district produces over one-third of the world's gold output yearly, while the Kimberley mining district yields more diamonds than any other place in the world. The country in general is level, adapted to farming. Pretoria (80,000) is the seat of government. Johannsburg (300,000) is the largest city; Cape Town (225,000) the second largest. The total population about 8,000,000. See *Boer War, Transvaal*, etc.

Uniontown, Pa., 43 miles southeast of Pittsburgh, was settled in 1767. The city is a manufacturing center, the district being rich in iron and coal. Population, 18,000.

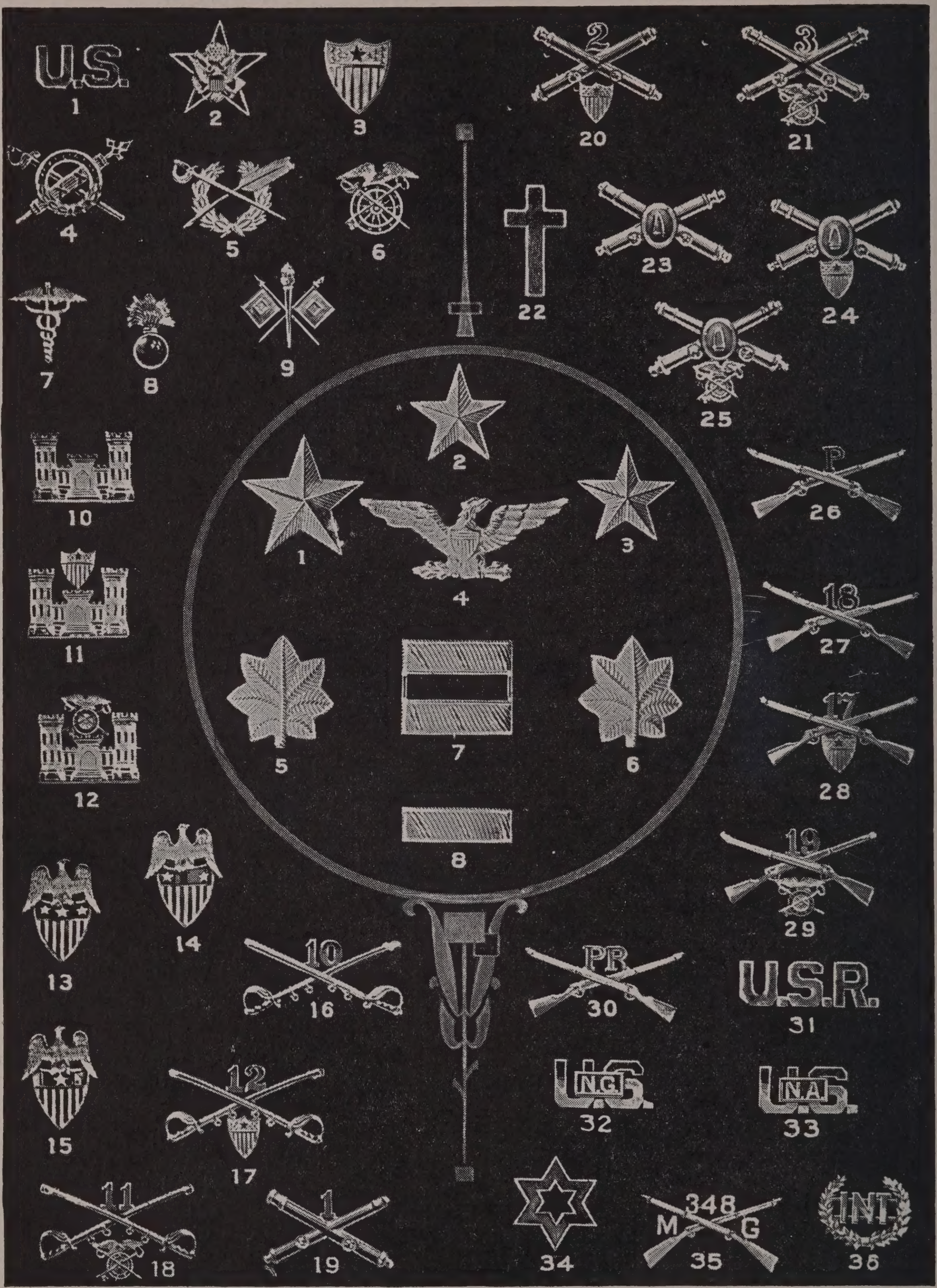
United Church of Canada, a union under one general organization of three Protestant denominations—Methodist, Presbyterian, and Congregational—effected in Canada in 1925. The majority of the churches of each of the denominations united with the organization, feeling that greater good could be accomplished thereby. The United Church contains 30 per cent of the population of Canada.

Uni'ted States of Amer'ica, The, a federal republic in North America, composed of states, territories and districts on the continent, of insular dependencies and possessions in the Pacific and Atlantic Oceans and of the Panama canal-zone in South America. Washington, D. C., is the capital.

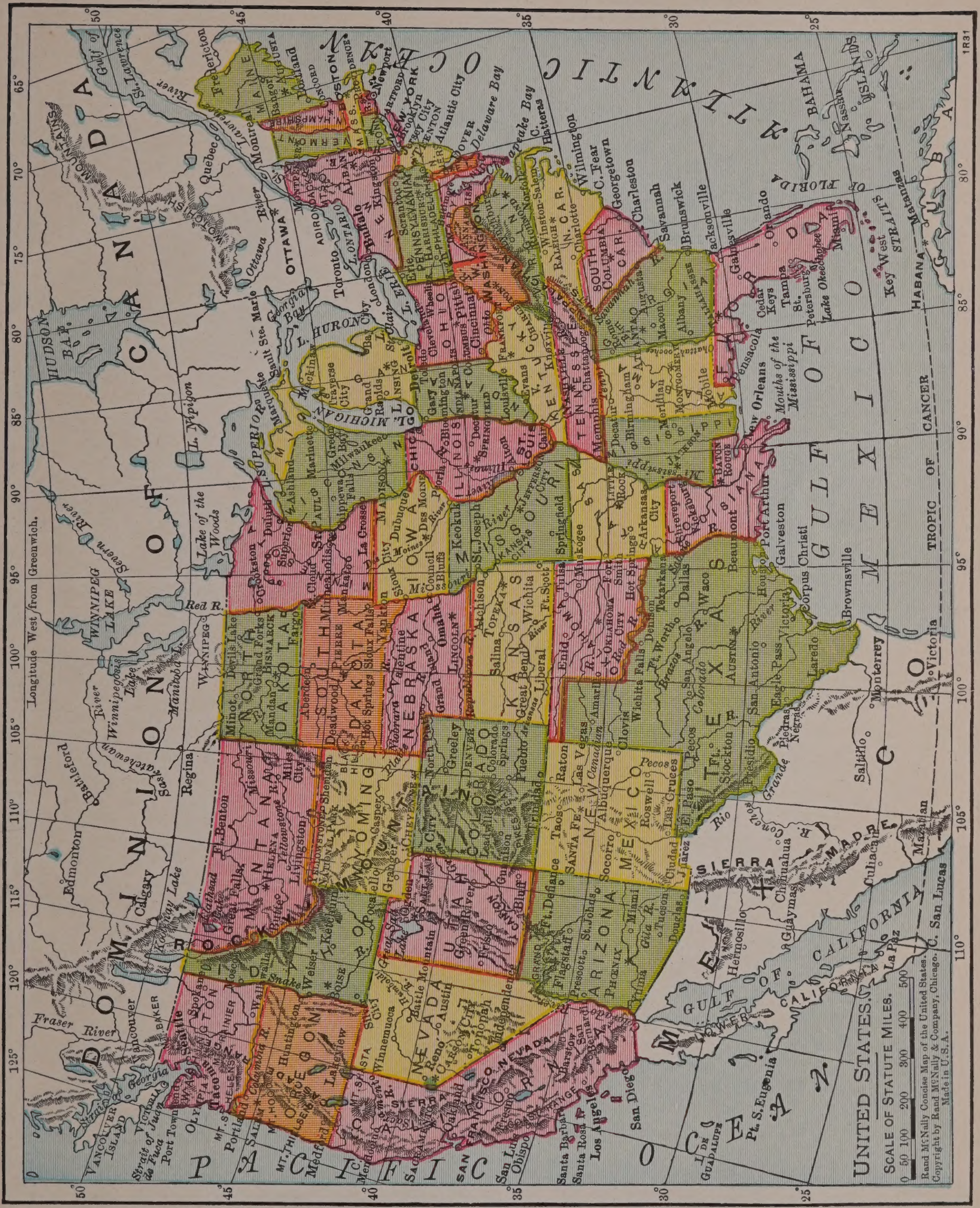
AREA AND BOUNDARIES

The continental United States, excluding Alaska (*q. v.*), occupies the central area of North America. It lies between the Atlantic on the east, the Gulf of Mexico and Mexico on the south, the Pacific on the west and Canada on the north. It extends approximately from 67° W. to 125° W. in longitude and from 24° 30′ N. to 49° N. in latitude. Its longest line, east and west, is 3,100 miles; north and south, 1,780. Its continental area, including Alaska, is 3,617,673 square miles. (That of Alaska is 590,884.) But the republic's total territory, when the area of Guam, Guantanamo, Hawaii, the Philippines, Porto Rico (with Culebra and Vieques), the Panama zone, Danish West Indies, five Samoan islands and other islands in the Pacific is included, comprises over 3,750,700 square miles. (See articles on each.) Part of the northern boundary runs through Lakes Superior, Huron, Erie and Ontario and their connecting waters and through St. Lawrence, St. John and St. Croix Rivers, while the Rio Grande forms part of the southern boundary. The Canadian boundary extends 3,700 miles, the Mexican 2,105, and the entire boundary stretches 11,075 miles. The continental United States and Alaska almost equal all Europe in size, and the entire territory of the republic is surpassed in extent only by that of the British Empire, of Russia and of China. When the sun is setting on Porto Rico and Maine, it is rising on the Samoan and the Philippine Islands; and the American flag dominates the Arctic Ocean of Alaska and the tropical South Sea of Tutuila.

INSIGNIA OF ARMY OFFICERS



Central circle insignia show officer's rank. Badges in outside space show to what division of the service he belongs. Rank insignia: 1. Lt. General 3 stars (silver). 2. Maj. General 2 stars (silver). 3. Brig. General 1 star (silver). 4. Colonel (silver). 5. Lieut. Colonel (silver). 6. Major (gold). 7. Captain (silver). 8. 1st Lieut. (silver). 2nd Lieut. (gold). Badges indicating character of service: 1. All officers. 2. General Staff. 3. Adjutant General's Dept. 4. Inspector General's Dept. 5. Judge Adv. General's Dept. 6. Quartermaster Corps. 7. Medical Corps. 8. Ordnance Department. 9. Signal Corps. 10. Corps of Engineers. 11. Corps of Engineers, Adjt. 12. Corps of Engineers, Quartermaster. 13. Aids of Lieut. General. 14. Aids of Major General. 15. Aids to Brig. General. 16. Cavalry. 17. Cavalry Adjutant. 18. Cavalry Quartermaster. 19. Field Artillery. 20. Field Artillery, Adjt. 21. Field Artillery. 22. Chaplain. 23. Coast Artillery. 24. Coast Artillery, Adjt. 25. Coast Artillery, Quartermaster. 26. Infantry, Philippine Scouts. 27. Infantry. 28. Infantry, Adjt. 29. Infantry, Quartermaster. 30. Infantry, Porto Rico Rgt. 31. Officers, U. S. Reserve Corps. 32. Officers, National Guard. 33. Officers, National Army. 34. Chief of Staff or Assistant Chief of Staff. 35. Officers Machine Gunners. Upper figures (as 348) designate battalions or regiments. 36. Officers (Corps of Interpreters).

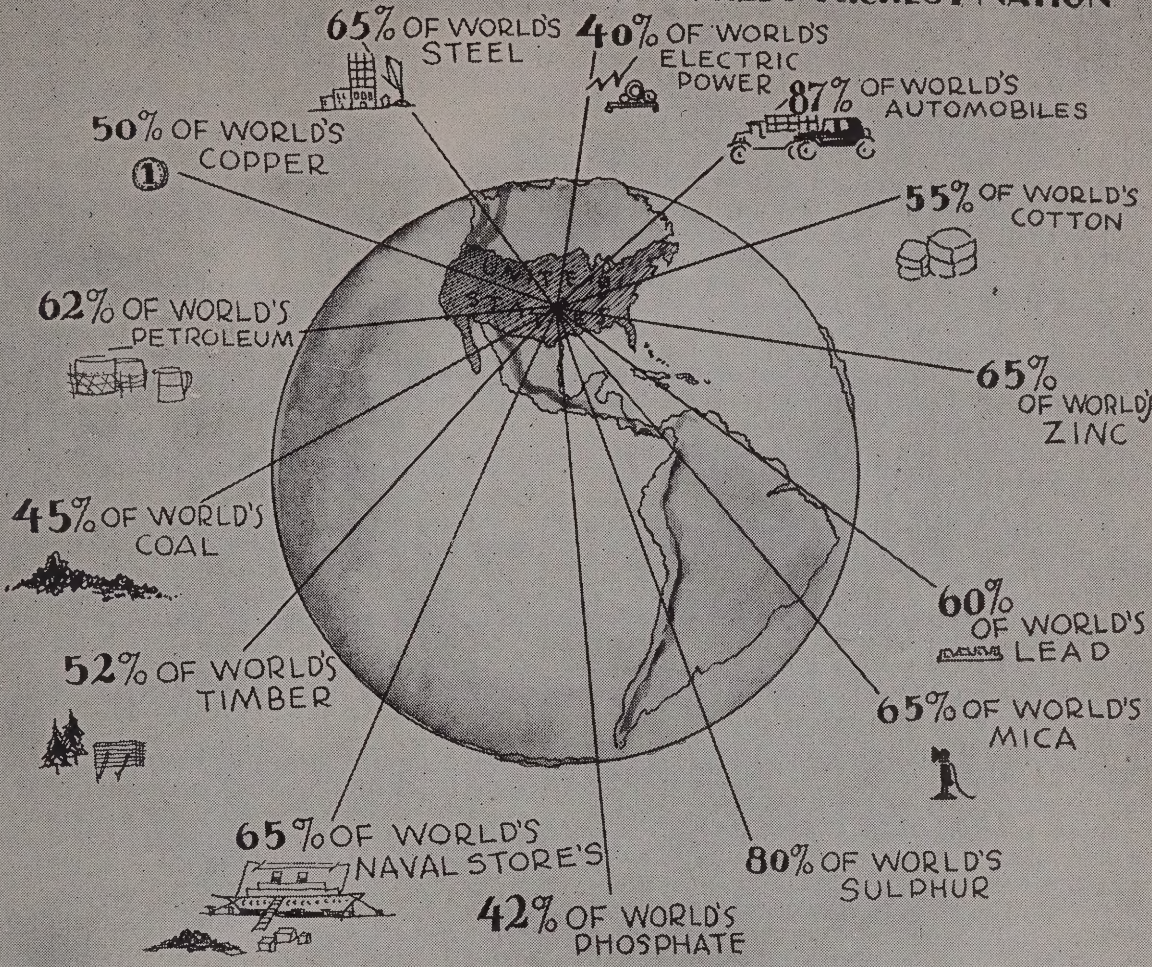


UNITED STATES.

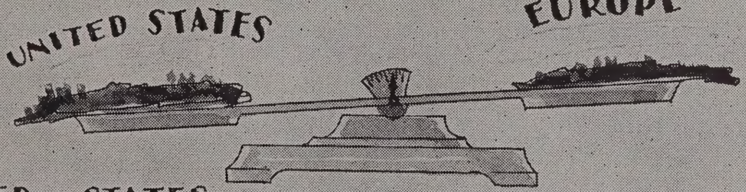
SCALE OF STATUTE MILES.
0 50 100 200 300 400 500
Longitude West from Greenwich.
DOMINION OF CANADA
PACIFIC OCEAN
ATLANTIC OCEAN
GULF OF MEXICO
MEXICO
TROPIC OF CANCER
1R31

Rand McNally Concise Map of the United States. Copyright by Rand McNally & Company, Chicago. Made in U.S.A.

WHY THE UNITED STATES IS THE WORLD'S RICHEST NATION


65% OF WORLD'S STEEL
40% OF WORLD'S ELECTRIC POWER
87% OF WORLD'S AUTOMOBILES
50% OF WORLD'S COPPER
55% OF WORLD'S COTTON
62% OF WORLD'S PETROLEUM
65% OF WORLD'S ZINC
45% OF WORLD'S COAL
60% OF WORLD'S LEAD
52% OF WORLD'S TIMBER
65% OF WORLD'S MICA
65% OF WORLD'S NAVAL STORE'S
80% OF WORLD'S SULPHUR
42% OF WORLD'S PHOSPHATE
UNITED STATES

WHY THE UNITED STATES OUTBALANCES ALL EUROPE


UNITED STATES
EUROPE

UNITED STATES		EUROPE
3,526,789	AREA	3,909,395
117,000,000	POPULATION	480,000,000
12,000,000,000	IRON ORE TONS	8,900,000,000
37,000,000	COTTON BALES	NONE
3,400,000,000	CORN WHEAT BUSHELS	2,000,000,000
250,500	RAILROADS MILEAGE	225,000
3,500,000,000,000	COAL UNMINED TONS	3,000,000,000,000

COASTAL FEATURES

The coasts on the Atlantic and Pacific Oceans reach 12,101 miles, the Atlantic coast (including that of the Mexican Gulf) being 9,568 miles in extent and the Pacific coast 2,533. This shows that the Atlantic coast, which is only 2,349 miles long if the windings of the shore are not followed and if the 3,551 miles of Gulf coast are deducted, is less regular than the Pacific coast. Consequently the most numerous and the largest harbors are on the Atlantic and face Europe. There are many large inlets and bays. Penobscot, Massachusetts, Cape Cod, Narragansett, New York, Delaware and Chesapeake Bays and Long Island, Albemarle and Pamlico Sounds are the most important indentations on the Atlantic shore. Along the Gulf are Apalachee, Galveston, Mobile and Tampa Bays. On the Pacific are Monterey, San Diego and San Francisco Bays, Puget Sound, the Strait of Fuca and Santa Barbara and San Pedro Channels. Alaska, too, has numerous bays and sounds. The United States shores of the Great Lakes (*q. v.*) add 3,000 miles more to the continental coasts of the republic. Their total length, following the windings of all shores, is 22,609 miles. (Those of Alaska and the islands cannot here be given.) There are no large islands off these coasts, Long Island (*q. v.*) being the most considerable. Next in importance come the islands off Maine and Massachusetts and the Santa Barbara group off California. Alaska has many large islands. Cuba is but 90 miles south of Florida, and southeast of Florida lie the nearby Bahamas. Prominent projections on the Atlantic coast are Capes Cod and Hatteras and the peninsula of Florida; in the Gulf the Mississippi delta and Cape San Blas; and on the Pacific Cape Mendocino. (See titles and COAST-SURVEY.)

SURFACE AND DRAINAGE

The United States divides naturally into four physical regions, two of which are elevations and the others lowlands. The elevated regions are the Appalachian Mountains in the east and the Rockies in the west, both trending north and south in general. (See ALLEGHANY and ROCKY MOUNTAINS.) There also are the Ozark Mountains of Missouri and the Black Hills of South Dakota. The lowland regions are the Atlantic slope and the Mississippi valley, the Pacific lowland being too narrow to form a main division.

The Appalachians extend from Canada into Georgia and Alabama, nearly parallel with the Atlantic, 20 to 100 miles inland, and known from north to south as the Height of Land in Maine, the White Mountains in New Hampshire, the Adirondacks and Catskills in New York, the Berkshires in Massachusetts and Connecticut, the Highlands in New Jersey and the Alleghanies in Pennsylvania and the south, where they have parallel ranges, as the Blue Ridge. (See articles under titles above.) This mountainous country, with heights of 6,000 feet, is about 100 miles wide, and forms nature's barrier between the Atlantic slope and the Mississippi valley. It, however, is broken by the Connecticut, Hudson, Mohawk, Delaware, Susquehanna, Potomac and James Rivers. (See these titles). Mitchell's Peak and Mount Washington are its highest points.

The Rockies, about 1,000 miles west of Mississippi River, reach from Mexico into Alaska. Their width averages 300 miles, though at some points it reaches 1,000 miles, and many of their peaks in the United States top 14,000 feet. The Sierra Nevada of California, the Cascade Range of Oregon and Washington and the Coast Range are parallel ridges of the Rocky Mountains. Mt. Whitney of the Sierra Nevada rises 14,887 feet and Mounts Hood and Shasta and Long's and Pike's Peaks are nearly as high. In Alaska Mt. McKinley towers 20,464 feet, the loftiest height on the continent; and St. Elias 18,024. (See the titles).

The Atlantic slope, between the Appalachians and the ocean, generally has low coasts, sloping inward to the hilly regions or Piedmont (*q. v.*) at the base of the mountains. Many of its rivers are navigable, the larger streams flowing more than 300 miles. Among these are the Penobscot, Kennebec, Hudson, Connecticut, Delaware, Susquehanna, Potomac, James, Cape Fear, Neuse, Roanoke, Santee, Savannah and Altamaha. (See titles). Small lakes also abound in New England and the middle states. The streams emptying into the Gulf include the Chattahoochee, Alabama, Pearl, Mississippi, Sabine, Trinity, Brazos, Colorado of Texas, Nueces and Rio Grande. The junction of the Atlantic slope and the Piedmont is marked by a ridge called the falls' line, because the streams from the Appalachians drop at this uplift and create the water-power of New England, the middle Atlantic states and the eastern states of the south. (See articles on the rivers named.)

The vast interior plain between the Appalachians and the Rockies and Canada and the Mexican Gulf is watered by the mighty Missouri and Mississippi and their 10,000 tributaries and is one of the most fertile regions on the globe. Its hills are covered with forests and its plains and prairies produce the huge crops of grain and cotton that feed and clothe the world. The eastern part of this central region is hilly, and West Virginia and eastern Tennessee and Kentucky are covered with heavy forests. The center is prairie, merging toward the Rockies into enormous plains covered with wild grass, sage-brush and cactus, having but slight rainfall and depending on irrigation (*q. v.*) to render it profitable to cultivate. In the north the plain drains into the Great Lakes and forms the lake region; in the south, where it meets with the Atlantic plain in Alabama, it drains to the Gulf and forms the Gulf region, which extends from Georgia and Florida far into Texas. The great rivers of the Mississippi valley are the Missouri and the Mississippi and their chief branches, as the Ohio, Minnesota, Wisconsin, Yellowstone, Dakota, Platte, Des Moines, Illinois, Kansas, Arkansas, Red and Yazoo, to say nothing of such tributaries of the Ohio as the Cumberland, Tennessee or Wabash or of the tributaries of the other chief branches. Many of these and their tributaries extend from 1,000 to 2,000 miles. The Mississippi valley is also bordered by the world's largest bodies of fresh water, which the St. Lawrence connects with the Atlantic, while Wisconsin, Minnesota and Michigan are noted for numerous small lakes.

The Pacific slope comprises the most varied region of the United States, broken by great plains and lofty mountain-valleys 10,000 feet above the sea, descending by great steps to the lower levels. It has huge cañons — river-beds thousands of feet deep; arid plains; heavy forests in the north; and a great basin without drainage to the sea. Here is the famous Great Salt Lake of Utah. Its rivers are the Columbia and its branches; the San Joaquin; the Sacramento and the Colorado of the west, all flowing into the Pacific.

The drainage-systems of the United States number five, and have already received full description in the article on AMERICA (NORTH). They comprise the Atlantic, Gulf (including the Missouri-Mississippi system also), Great Basin, Lake and Pacific river-systems. (See articles on each topic). They give the country 100,000 miles of inland navigation — the most extensive in the world. Among the minor lakes, in distinction from the Great Lakes, may be mentioned Champlain, Moosehead, Oneida and its famous sister-lakes in New York, Salt Lake and Tahoe. (See these titles).

Natural Features. No country equals the United States in beauty, grandeur and variety of scenery. Among the many interesting features are Crawford Notch, Delaware Water-Gap, the Hudson Highlands and Palisades, Watkins Glen, Niagara Falls, Luray Cave, the Natural Bridges in Utah and Virginia, Harper's Ferry, Mammoth Cave in Kentucky, the vast prairies, the inland seas, the mighty streams of the interior, St. Anthony and Minnehaha Falls, the Dalles of the Wisconsin, the Pictured Rocks, the passes of the Missouri and of the Columbia through the mountains, the falls of the Yellowstone, Snake and Missouri Rivers, Yellowstone Park, the hot-springs and the geysers, Yosemite Park and Falls, the Big Trees, Royal Gorge, Grand Cañon and the Yellowstone Cañon. (See articles under titles above and GEOGRAPHY, GEOLOGY and GEOLOGICAL SURVEY.)

CLIMATE

The climate of a country stretching over 24½ degrees of latitude and ranging from coastal plains to lofty mountains and tablelands varies greatly. In most parts of the land it is extremely changeable, with great variations of temperature between summer and winter. The Atlantic states are colder than European countries in the same latitudes, but the Pacific coast has a climate as mild as Italy's. The Gulf states and Georgia and South Carolina verge toward a subtropical climate. The rainfall is plentiful, except in some parts of the west, and is distributed throughout the year, except on the Pacific coast, where it occurs in spring and in winter. There also is every variety of soil, including prairie lands covered with rich mould, sometimes 25 feet deep, and the sterile, arid plains of the Utah or Great Basin. (See AGRICULTURE, AMERICA, COLD WAVE, RAIN and SOIL.)

RESOURCES

These consist of the natural products of the soil and the waters, as minerals, forests, native plants and animals and fish and other aquatic animals. Their vast variety and abundance, with the great range of climate, make the United States a world in itself able to raise almost all products of the temperate and the tropical zones. For the flora and fauna see AMERICA and articles on such subjects as, *e. g.*, CORN or DEER.

Minerals. These include coal, copper, gold, iron, lead, mercury, nickel, platinum, precious stones, silver, zinc and such building-stones as granite, limestone, marble, sandstone, slate and trap. (See articles under titles above.) Aluminum, asphalt, clay, gypsum, mineral springs, natural gas, petroleum, Portland cement, phosphate-rock and salt also abound. (See articles on each.) In the production of aluminum, coal, copper, iron, lead, natural gas, petroleum, quicksilver, phosphate-rock, silver and steel the United States ranks first; in producing gold it stands second; in zinc third. In 1920 the production of gold was 2,400,000 ounces, or $50,000,000; of silver 56,564,000 ounces, or $57,420,000; of coal (anthracite and bituminous) 636,063,000 metric tons worth $2,200,000,000; of iron 69,558,000 metric tons; of steel 34,432,000 tons, the value of the steel and iron tonnage together being estimated at $1,500,000,000; and of lead 476,000 tons worth $76,000,000. In 1920 all mineral products were worth $6,707,-

000,000; non-metallic ones $1,724,000,000; metallic ones $4,977,500,000; various unspecified $5,200,000. Much mineral wealth, especially in the south, remains undeveloped.

Forests. A greater variety of trees is found in the United States than in Europe, though nearly all European trees are found here, and originally forests covered a third of the country. But many sections in the Appalachians and around the Great Lakes have been stripped almost bare. Ash, beech, birch, chestnut, maple, oak, pine and walnut abound in the east; hemlock, spruce and white pine in the north; Douglas fir, redwood, sequoia and yellow cedar on the Pacific slope; and cypress and yellow pine in the south. (See articles under titles above.) The prairies originally were treeless as a whole, except along streams, but forests have been planted to a considerable extent. Nearly 1,100,000 square miles of the United States are woodland, nearly a third being on the Rockies and along the Pacific. Probably the heaviest stand of timber on earth is found in California, Oregon and Washington. See AMERICA (*Animals and Vegetables*); EUROPE (*Natural History*); FOREST-RESERVES; LUMBERING; and NATIONAL PARKS.

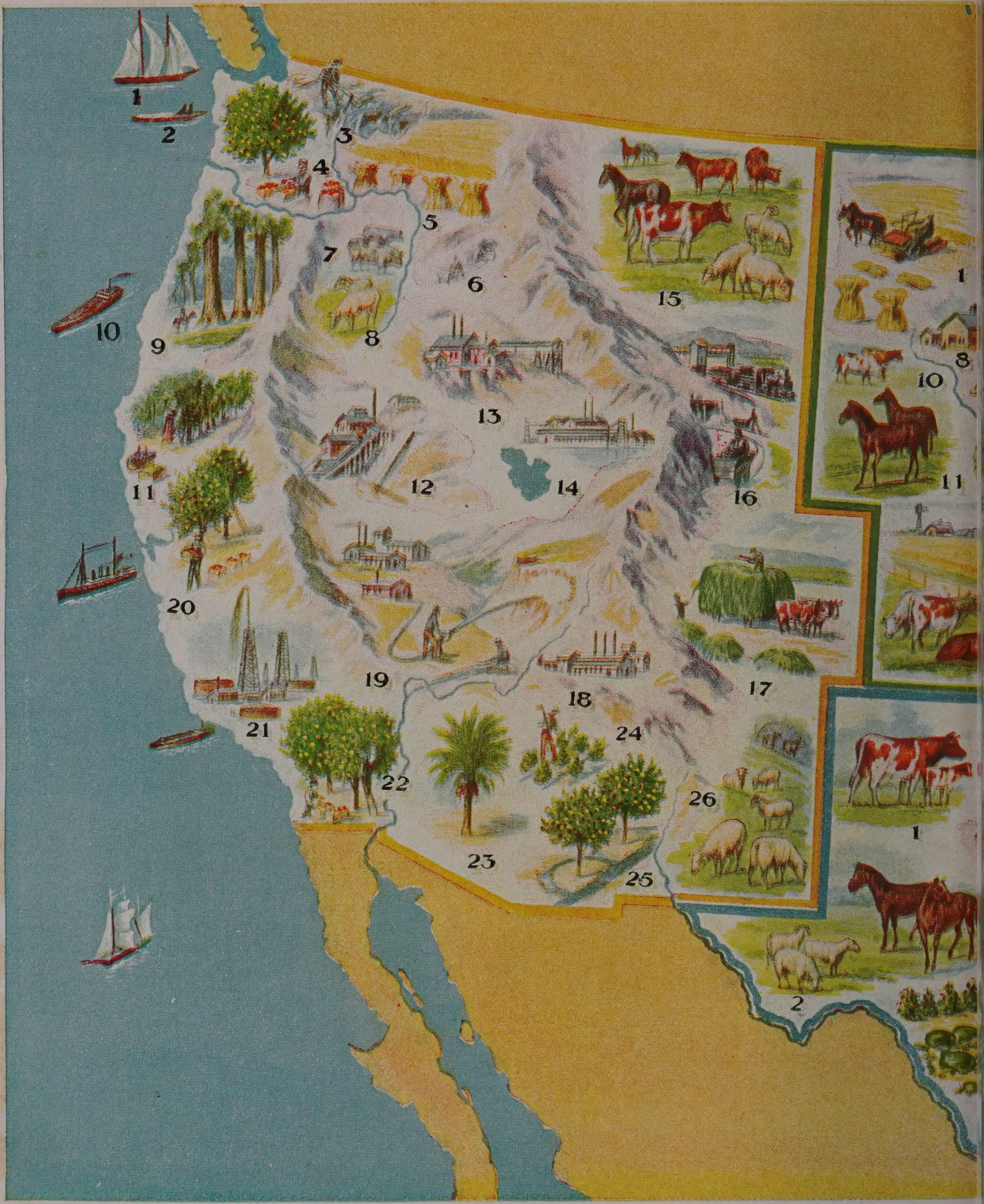
Fish and Game. The varieties of fish in United States waters number 816, of mollusks 1,000; while the mammals number 310 varieties, the birds 756. The most important fish, commercially, are the bluefish, cod, halibut, herring, mackerel, menhaden, sardines and shad of the Atlantic; the redfish and tarpon of the Gulf; the salmon of the Pacific; and the bass, perch, pickerel, pike, muskellunge, salmon, trout and whitefish of the inland waters. The chief gamebirds and waterfowl used as food are ducks, grouse, pigeons, quail, turkey and wild geese. The most important game-animals are antelope, bear, deer, mountain-sheep (nearly extinct) and moose. The chief edible mollusks are clams, lobsters, oysters and scallops. The terrapin is another marine delicacy. (See articles under titles above and FISH-CULTURE, FISHES and FURS.)

INDUSTRIES

The chief classes of industries in the order of importance are manufacturing, agriculture (including stock-raising), mining, forestry (or lumbering) and fishing. In each of these industries the United States leads the world The value of the products of manufactures in 1909 was $20,672,052,000; of those of agriculture, in 1910, $8,926,000,000 (over one-half being products of farm animals), of those of mining $2,003,744,869 in 1910, of those of lumbering $724,705,760 in 1909, and of those of fishing $67,898,859, while the output of the fish-canneries was worth $27,648,289. Thus the four main groups of industries annually average an output worth over $32,000,000,000.

Manufactures. During the last 40 or 45 years manufactures have expanded more rapidly than has any other class of industries. The east has become an almost exclusively manufacturing section, but the interior and the south have made enormous strides as manufacturers. Abundant natural resources from farm, forest, mine and waters; cheapness and plentifulness of fuel; fine water-power, with steam and electricity; inventive genius in the people; intelligence, industry and thrift; exceptional facilities for transportation; millions of immigrants; unhindered commerce between the states; and unequaled advantages for labor as well as for capital from the laws of the land, the national and state constitutions and the democratic nature of American society—have all combined to make the United States the source of a third of the world's manufactures. The sole disadvantage has been the high price of labor. This has been offset by its efficiency and the low cost of food and clothing. The 1910 census of manufactures, which was confined to factories and excluded local industries and hand trades, grouped them as follows, according to the character of the finished products: Food and kindred products; textiles; iron and steel and their products; leather and its products; chemicals and allied products; clay, glass and stone products; vehicles for land transportation, and miscellaneous industries. Among these food and kindred products led with a value of over $3,035,000,000. Iron, steel and their products, including foundry and machine shop products, steel works, rolling mills and blast furnaces, were worth over $2,605,000,000; textiles, $1,684,636,000; flour and grist mill products, $883,584,000. The establishments numbered 268,491, representing an investment of $18,428,270,000, having a force of employes (salaried and wage-earning) of 7,405,313, and paying them $4,365,613,000. The food industries include the making of butter, cheese and condensed milk, canning and preserving, flour-making and grist-milling, rice-cleaning, slaughtering and meat-packing and sugar-refining. The textiles manufactured are carpets and rugs, cordage and twine, cotton and felt goods, hosiery and knit goods, oilcloth and linoleum, shoddy, silks, woolens, worsteds, etc. Iron and steel manufactures produce bars, castings, blooms, forgings, ingots, plate, rails, slabs and structural shapes. The manufacture of automobiles is now third among manufacturing industries; in 1921 1,680,000, valued at $1,222,000,000, were made. The chemical and allied industries included acids, cottonseed product, dyestuffs, extracts, explosives, fertilizers, gas, paints and petroleum-refining. Electricity, gas, steam, water and even wind

Map-Picture Story of Uncle S



If you could visit the United States "all at once," this map tells in a striking way how

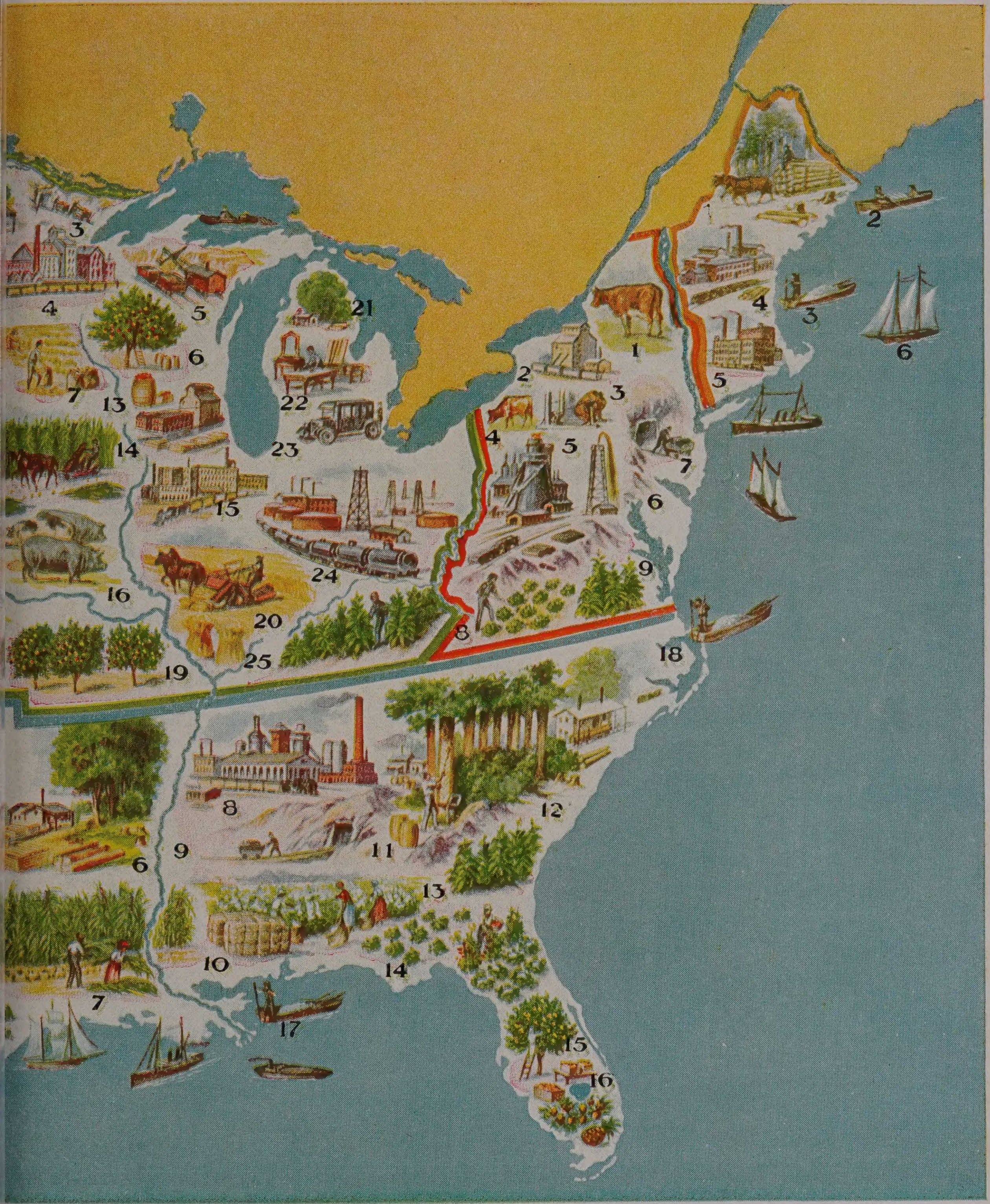
WESTERN STATES

1, Fishing Schooner. 2, Fishing Boat. 3, Salmon Fishing. 4, Apples. 5, Wheat. 6, Copper. 7, Hogs. 8, Sheep. 9, Lumber. 10, Lumber Boat. 11, Grapes. 12, Gold and Silver. 13, Silver. 14, Salt. 15, Cattle, Horses and Sheep. 16, Coal. 17, Alfalfa. 18, Copper. 19, Gold. 20, Peaches. 21, Oil. 22, Oranges. 23, Dates. 24, Vegetables (Irrigated Land). 25, Apples (Irrigated Land). 26, Sheep.

CENTRAL STATES

1, Spring Wheat. 2, Lumber. 3, Copper. 4
Mill. 5, Iron. 6, Apples. 7, Potatoes. 8, Da
Butter and Cheese. 10, Cattle. 11, Horses. 12
13, Packing House. 14, Lumber Yard. 15,
Manufacture. 16, Hogs. 17, Oats. 18, Cattle. 19,
20, Winter Wheat. 21, Lumber. 22, Furnitur
Automobiles. 24, Oil. 25, Tobacco.

Resources and Great Industries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urces and the great industries based upon them would look, and where they are located:

SOUTHERN STATES

Cattle. **2,** Sheep. **3,** Horses. **4,** Oil. **5,** Vegetables. umber. **7,** Sugar Cane. **8,** Steel Mill. **9,** Coal. otton. **11,** Turpentine. **12,** Lumber. **13,** Tobacco. Vegetables. **15,** Oranges. **16,** Pineapples. **17,** er Boats. **18,** Oyster Boat.

MIDDLE ATLANTIC

1, Cattle. **2,** Grain Elevator. **3,** Butter. **4,** Cattle. **5,** Steel Manufacturing. **6,** Oil. **7,** Coal. **8,** Peanuts. **9,** Tobacco.

NEW ENGLAND STATES

1, Lumber. **2,** Fishing Boat. **3,** Oyster Boats. **4,** Paper Mill. **5,** General Manufacturing. **6,** Fishing.

mills and animals were used to produce power. The manufacture of electrical apparatus has become an immense industry, and in making agricultural machines and tools the United States excels every other country. The hand-trades and the local industries annually produce over $1,200,000,000 of goods. The manufactures of the United States equal those of France, Germany and the United Kingdom together. (See FURNITURE, GLASS, SMELTING and STEEL; articles on other manufactures; and the subject of *Manufactures* in articles on states.)

Agriculture. Fore more than a century the United States has been the greatest agricultural country on the globe. The American farmer in two years produces more wealth than have all the gold-mines of the entire world since 1492. The immense extent of fertile land, the liberal policy of the national government as to the public domain (see HOMESTEAD LAWS and PREËMPTION), the climatic advantages and the comparative ease of access are among the causes that brought about this preëminence. In the continental United States, excluding Alaska and the islands, there remained 327,489,968 acres of public lands on July 1, 1911, still available for settlement. Most of this, however, is in mountainous and arid regions. In 1910 the farms were worth $28,475,674,169. The size of an average farm is about 138 acres. Agriculture employs nearly 11,000,000 people, almost half of all laborers in the United States, and almost 5,000,000 families live on farms. The chief agricultural areas are the central plain from the Appalachians to 100° W.; the Gulf states and Georgia; and the Pacific slope. But the Atlantic slope also abounds in valuable farms on its fertile lowlands; and the soil of the arid regions along the Rockies — regions comprising nearly a third of the United States—is generally fertile and only needs irrigation (*q. v.*). New York and New England chiefly engage in mixed farming and in dairying; the Mississippi valley grows the cereals; the south cotton, sugar, tobacco and tropical fruits, besides truck-farming for northern markets; and the Pacific coast grain and fruits. The agricultural products of the United States form the bulk of the exports.

Cereals are the most important farm-product, and corn (*q. v.*) leads in the amount grown. In 1910 the yields were 3,125,713,000 bushels of corn; 1,126,765,000 of oats; 695,443,000 of wheat; 162,227,000 of barley; 33,039,000 of rye (some European countries far surpassing the United States as producers of rye); 24,510,000 of rice; and 17,239,000 of buckwheat. (See articles under these titles.) In 1910 the corn of the United States was worth $1,523,713,000; the wheat $621,443,000; the oats $384,716,000; the barley $93,785,000; the rye $23,840,000; and the buckwheat $11,231,000. All cereals in that year totaled 5,140,896,000 bushels and were valued at $2,710,000,000.

Cotton (*q. v.*) stands next to corn as a commercial asset of the United States. It is the chief product of the south, and in 1909 it was worth $703,619,303. The cotton states from first to last in production that year were Texas, Georgia, South Carolina, Alabama, Mississippi, Arkansas, North Carolina, Oklahoma, Louisiana, Tennessee, Florida, Missouri, Virginia and Kentucky.

The humble hay-crop, however, has sometimes been worth even more than cotton, though lacking its commercial and industrial importance, for in 1910 it weighed 60,978,000 tons and was valued at $747,769,000.

Potatoes (Irish and sweet) were valued at ($187,985,000), Wisconsin, Minnesota and New York raising Irish potatoes in large quantities, and southern Illinois and the south the sweet potato. See POTATO.

Fruit-raising, taken in the widest sense, is a great branch of American agriculture. In Delaware, Florida, New Jersey, southern California, western New York and western Michigan it is the leading industry of the farm. In the mountainous regions of Montana, in Oregon and in Washington it also is a great industry. Oranges and pineapples are the chief fruits of Florida; almonds, apricots, grapes, lemons, oranges and prunes of the greatest importance in California; grapes in New York and Ohio; apples in New York and New England; peaches in Michigan and Georgia. Small fruits, as blackberries, gooseberries, raspberries and strawberries, are grown almost everywhere. Over half a billion bushels of apples, apricots, grapes, peaches, pears, prunes and small fruits are raised, apples being largely exported, and the value of the fruit crops, nuts and orchard products some years reaching $140,000,000. (See FRUIT and articles under titles as above.)

Tobacco (*q. v.*) is another of the great crops. In 1910 it was raised on 1,233,800 acres to the amount of 894,349,000 pounds valued at $91,458,773. For rice and sugar see articles under these titles. In 1910–11 the output of cane-sugar was 311,000 tons; beet-sugar 455,000 tons, the sugar-beet being cultivated in many of the states with temperate climates. Considerable flax is grown, chiefly for seed, in Minnesota, Wisconsin and some other states of the north, the yield in 1909 being 25,856,000 bushels.

Stock raising (including poultry farming) and dairying are other great branches of American agriculture. In 1909 the dairy factories used 9,888,727,303 pounds of milk and 1,406,143,908 pounds of cream, and made 624,764,653 pounds of butter; 311,126,317 of cheese, and 494,796,544 of condensed milk, the value of the three being $274,557,718. New York, Wisconsin and

Iowa have the largest dairy-industries. The leading states in the raising of poultry are Iowa, Illinois, Missouri, Ohio and Indiana. Among the grazing states Texas leads in the raising of cattle, Montana in that of sheep. In 1911 the wool-clip was 318,547,900 pounds, the United States ranking only fourth among the wool-producing countries of the world. (See DAIRY-FACTORY, GARDENING, GRAZING, POULTRY, RANCHING, STOCK-RAISING and WOOL.)

Mining. This stands third among the groups of industries of the United States. The total quantity of ores, minerals and metals produced can not be given, because the measures for the different products differ, but in 1910 their value was $2,003,744,869. (See MINING and articles on such subjects, in alphabetical order, as ALUMINUM, MICA or ZINC.) Gold is produced mainly in Colorado, California and Nevada; silver in Colorado, Montana, Utah and Idaho; sapphires in Montana, North Carolina and Idaho; and turquoises in Arizona and New Mexico. Agates, amethysts, beryls, diamonds, garnets, pearls, rubies, quartz crystals and tourmaline are also found. (See articles under these titles.) Since 1902 about $1,500,000 of precious stones (*q v.*) have been mined.

Lumbering. This industry ranks fourth among those of the country, the manufacturing, agricultural and mining *groups* of industries preceding it, as do also the *single* industries of steel and iron, textiles and slaughtering and meat-packing. Two-thirds of the woodland are in the east and south, less than a third being on the Pacific slope and the Rockies. The merchantable forests cover 500,000 square miles. Of the 320,000 square miles of these forests in the east, the lake states and the south, 175,000 are soft wood and the rest hard wood. The white pine is in Michigan, Minnesota and Wisconsin, the yellow in the southern states. In 1909 there were 40,671 lumbering establishments with a capital of $1,176,675,000. They used $508,118,000 of raw material. The finished product, excluding fuel, minor products, naval stores and woodpulp, was worth $1,156,129,000. The value of the sawn lumber was $435,708,084. Four fifths of the cut come from the conifers. (See FOREST, LUMBERING, PINE and articles on such states as CALIFORNIA, GEORGIA, MAINE, MICHIGAN, OREGON, WASHINGTON and WISCONSIN.)

Fishing. In the extent and value of its fisheries the United States leads the world. The industry employs 6,931 vessels and 219,139 men; has a capital of $93,874,269; and produces to the value of $59,977,339. (The statistics include Alaska and sealing.) The Atlantic states produce about 75% of the output, the Pacific states 15, the Great Lakes and the Gulf five each (about 50,000 tons each annually.) The total fish-catch is over 1,000,000 tons a year, the aggregate catch from waters not included in the enumeration being considerable. Alaska, Oregon and Washington put up salmon; Massachusetts cures cod, herring and mackerel; and Maine tins sardines. Fish-canning and fish-preserving establishments in 1908 numbered 690, and employed 15,251 wage-earners, who were paid $4,247,000. The capital was $24,124,000 and the value of the output was $28,401,000. (See articles under titles above and BERING SEA, FURS and SEALS.)

COMMERCE

This is both domestic and foreign. The first is larger than that of any other country, and greatly surpasses that with outside nations. As shipments of interstate commerce are not entered at custom-houses, no statement as to the amount of domestic commerce can be made. But in foreign commerce, though America is only third among nations, our exports in 1911-12 were $2,204,322,000 and the imports $1,653,265,000. The best customers of the United States are the United Kingdom, Canada, and Germany, the next in order being France and Netherlands, as buyers, and as sellers, the United Kingdom and Germany leading, with France, Brazil, Cuba, and Canada following in the order named. Nearly $1,242,000,000 of our exports in 1911-12 (excluding gold and silver) went to Europe, while nearly $517,000,000 went to North America outside of the United States. Asia and Oceania took $189,400,000; South America $132,310,000; and Africa $24,000,000. From Europe we imported $819,585,000 worth of products; from North American countries $334,072,000; from Asia and Oceania $262,000,000; from South America $215,089,000 and from Africa $22,586,000. Our chief exports in 1912 consist of cotton, $565,849,000; iron, steel and their products, $268,154,000; meat and dairy products, $156,261,000; and breadstuffs, $123,980,000. Agricultural products form not quite one-half of the exports, manufactures about the same proportion. The leading imports in 1911-12 were coffee, $117,826,000; sugar, $115,515,000; india rubber and gutta-percha, crude, $102,942,000; hides and skins, $102,476,000; chemicals, drugs, and dyes, $92,030,000; raw silk, $69,542,000; and cotton goods $65,153,000. Raw materials formed 34% of the imports; manufactures for further use in manufacturing, 18; manufactures ready for consumption, 22; and animals and foods 26. The Atlantic slope transacts nearly two-thirds of the foreign commerce of the United States.

COMMUNICATION

Transportation in the United States is effected by means of waterways, roads, steam railroads and electric railways.

Communication is carried on by means of these and also by telegraphs, telephones and postal service. The waterways consist of the seas, rivers, lakes and canals. The last three offer 100,000 miles of inland navigation. The 38 principal canals used for commercial purposes extend nearly 2,500 miles. The Missouri-Mississippi system and the Great Lakes are the most important means of internal transportation by water. (See CANALS, GREAT LAKES and articles on rivers and states.)

American shipping in 1911 comprised 12,684 sailing vessels (including canal-boats and barges) and 13,307 steamships (*q. v.*), the tonnage of both classes aggregating 7,638,790 tons. The foreign commerce is, nine tenths of it, carried in foreign ships. The Atlantic and Gulf shipping is two thirds of the total American shipping and half of the tonnage. That of the lakes is an eighth of the number and a third of the tonnage. (See SHIPBUILDING.) The tonnage engaged in fisheries numbers 54,982 tons; in foreign trade only 863,495 tons; but in coastal trade 6,720,313 tons. The Atlantic ports had two-thirds of the shipping that entered and cleared.

The railways of the continental United States date from 1826, and in 1910 their total mileage was 240,438 miles, nearly half of the world's railway mileage and much more than that of Europe. As Britain is the island of ships, so the United States is the continent of railways. They penetrate every state and territory, even Alaska, Panama, Porto Rico and the Philippines; employ 1,699,420 men, whose wages in 1910 were $1,143,725,000: and in 1910 they carried 971,683,199 passengers and 1,849,900,000 tons of freight. Their passenger-cars would make a train over 500 miles long their freight-cars and engines another of nearly 10,000 miles length There are about 1,000 companies operating them. (See HARRIMAN, HILL, MORGAN and RAILROADS.) The United States systems also interlink with the Mexican and Canadian systems, American trains running from St. Louis into the City of Mexico, the Canadian Pacific crossing Maine and the Grand Trunk entering Portland and Chicago. In 1910 there were 40,088 miles of street and elevated roads operated by electricity and a few hundred miles operated by other power, and in densely peopled regions they are girdling the country with a network of interurban lines. (See ELECTRIC RAILWAY.) Wagon-roads, except in a few sections of the east, are inferior to those of Europe.

The telegraph and the telephone in the United States are private enterprises. In 1915 one telegraph company had 1,610,000 miles of wire and transmitted nearly 100,000,000 messages, excluding railway messages and those over leased wires. In 1906 the next largest company had 321,570 miles of wire and nearly 24,000 offices. Six cables connect the United States and Europe, while another links it with the Philippines and China. There also are cables to the Antilles and South America. In 1915 the Bell Telephone System alone had over 150,000 employees, and 18,500,000 miles of wire; owned 6,000,000 telephones, and connected with an additional 3,000,000 telephones of Non-Bell (Independent) Companies. The total number of completed messages or talks over its lines and telephones during the year was nearly 9,000,000,000 and the opening of the transcontinental telephone line, Jan. 25, 1915, makes it possible to talk from coast to coast, 3,400 miles, and from points in any one state to some points in every other state of the Union.

(See CABLES, TELEGRAPH and TELEPHONE.)

The postal business is carried on by the federal government (see POSTOFFICE and DEAD-LETTER OFFICE), the transportation of small or valuable freight by post or express though large goods are also forwarded by express instead of freight if speed is desired. (See EXPRESS COMPANIES.) Annually the postoffice handles 14,850,000,000 pieces of mail at a cost of $230,000,000 at 59,580 offices.

The rapidity of travel and communication in the United States is evinced by the fact that it takes the mail only four days and nine hours to traverse the 3,250 miles between New York City and San Francisco.

GOVERNMENT

This is based on the federal constitution of 1787 and the constitutions of the states. The national government (*q. v.*) began in 1774; the states when the first continental congress initiated their governments. The United States government is a federal republic, and each state is a representative republic, governing itself in its own affairs but without sovereignty and without any relation to any foreign power. The national constitution, which can be altered by the people, defines the powers of the federal government, and reserves "to the states respectively or to the people the powers not delegated to the United States by the constitution nor by it prohibited to the states." The administration of the affairs of the Union is entrusted to the executive, the legislative and the judicial authority.

Executive power is vested in a president (*q. v.*), the head of the government, and in a vice-president. Both are elected for a four years' term by an electoral college (*q. v.*). The president is commander-in-chief of the army and navy, though never appearing at their head, and of the militia in the service of the Union. Washington, for greater efficiency in the executive, in 1789 established the extraconstitutional departments of the navy, the postoffice (a postal system, however, existing before the Revolution), state, treasury and war; and in 1849 that of the interior was added, in 1870 justice, in 1889 agriculture, and in 1903 commerce and labor. (See UNITED STATES DEPARTMENTS.) The heads of these are executive officers, called secretaries (except the attorney-general and the postmaster-general); are appointed by the president with the approval of the senate; and form his cabinet (*q. v.*) or body of advisers. The president also appoints ambassadors, judges of the federal courts and almost all of the higher executive officers. (See DIPLOMATIC SERVICE). In the civil service (*q. v.*) of the Union there are nearly 330,000 executives. The vice-president is president of the national senate, *ex officio*, and, if the president die or resign, becomes president. His salary is $12,000 a year. If the vice-president die, a temporary president of the senate discharges his duties and receives his salary.

Legislative authority over the Union is vested in a national congress (*q. v.*), consisting of a senate and a house of representatives The first, nominally the ranking authority, represents the states; the second the people. Both bodies are now chosen by popular vote, a Constitutional amendment for direct election of senators being adopted in 1913. Each state has two senators, but has only so many representatives in the lower house as its population entitles it to. Nevada, *e. g*, has only about 50,000 inhabitants, New York over 8,000,000; yet Nevada as a state has two senators, but its people have only one representative in the house. As there is one representative to every 211,877 inhabitants, states of less population are given a representative. Representatives are elected for two years, senators for six, but a third of the senate goes out every two years. Territories send delegates to the house of representatives, Porto Rico a resident-commissioner. These are elected as representatives are; can speak in the house and make motions; but cannot vote. The salaries of senators, representatives, delegates and the Porto Rican commissioner are $7,500 a year (since March 4, 1907), with their expenses in travel, but the speaker receives $12,000. Alaska and the Philippines have an inofficial representation, but the District of Columbia has not even this. Congress governs the territories and districts and has power to enact legislation affecting the whole country, but it cannot change the laws of a state.

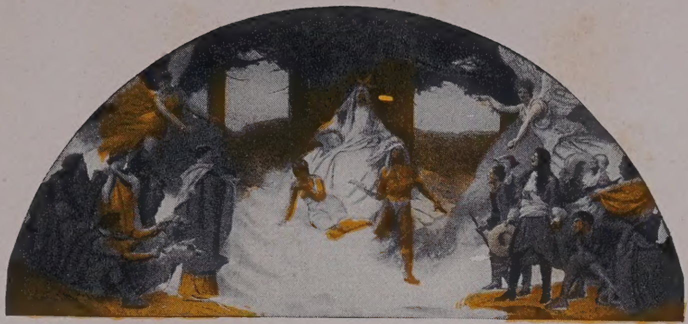
Judicial authority over the nation is vested in a supreme court, nine circuit-courts, a court of claims and 69 district-courts. (See COURTS.) Each circuit also has a court of appeals. There also are federal courts for the districts and for the territories. The national courts try civil causes arising from the laws of the *nation;* causes between citizens of different states; and crimes against the *whole* United States. These crimes consist chiefly of murder on the high seas, offences against postal or revenue laws and piracy. The judges of these federal courts are appointed for life by the president with the approval of the senate. Each state forms a district or several districts. The chief-justice of the supreme court receives $10,500 a year, the eight associate-justices $10,000 each. (See, also, CONGRESS and UNITED STATES DEPARTMENTS: JUSTICE.)

Each branch of the federal government is independent, within limits, of the others. To a degree they are coördinate. Yet all are so related together as to form a whole. The president or executive can veto a law of Congress and has such powers of a sovereign as appointing ambassadors and judges; but Congress, if two thirds of the senators and two thirds of the representatives sustain the vetoed law, can pass it; and the senate can refuse consent to his appointments. Only Congress can originate legislation; but the federal courts determine whether its laws are in keeping with the national constitution. Yet Congress has judicial functions, too, for the house alone has the power of impeachment and the senate then sits as a high court. The senate also has the excutive function of ratifying or rejecting treaties that the president makes with foreign countries. It is such features as these that made Gladstone pronounce the federal constitution "the most wonderful work ever struck out at a given time by the hand and purpose of man."

The states' governments mainly follow that of the nation. Each state must have a republican constitution, but this derives its powers from the citizens of the state. Admission of territories to the Union as states is effected by act of Congress and proclamation of the president. The state deals with all matters not reserved for the national government by the federal constitution nor falling within restrictions imposed by its own. It determines the qualifications for suffrage, and controls all elections. It also controls criminal and civil law, prisons, property and civil relations; marriage, divorce, education and charities; fisheries, game-laws, licensing and traffic. It charters and controls all corporations (*q. v.*) subject only to Congress's right to regulate interstate commerce; and it also regulates labor (*q. v.*). The state derives its revenue chiefly from a direct tax on property. (See *Government* in articles on states). Local government within a state is carried on by a borough or a municipality and by a county or a township. (See CITIZENSHIP, FACTORY LEGISLATION, MUNICIPAL GOVERNMENT and TOWN-MEETING.)

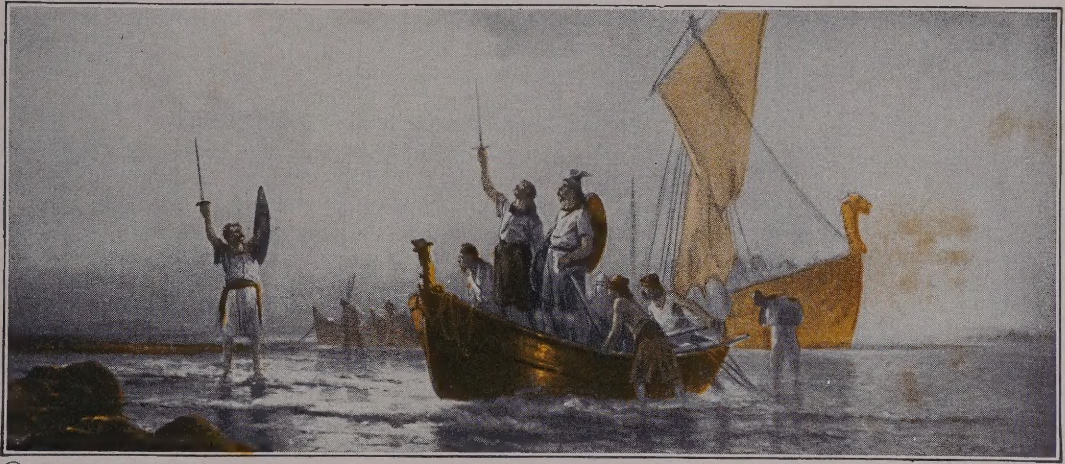
Territorial governments are states' govern

Our Discovery Period In Our Works of Art



©*Horace K. Turner Co., Boston* Mural Decoration, Minnesota Capitol

The Mississippi Valley—Its Discoverers and Colonizers, by Edwin H. Blashfield (American b. 1848)



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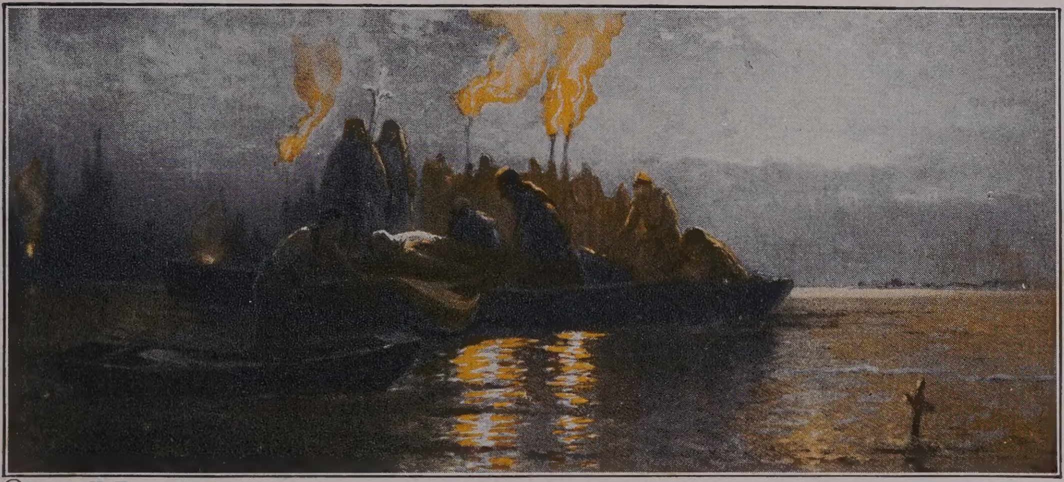
Landing of Lief Ericson, by Edward Moran (American b. 1829)



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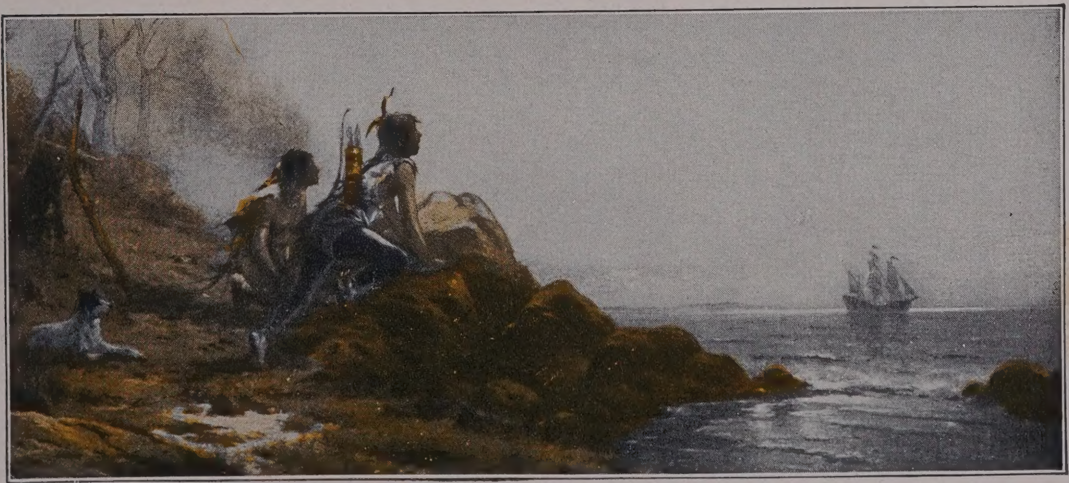
Midnight Mass on the Mississippi Over De Soto's Body, by Edward Moran



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Sir Henry Hudson Entering New York Bay, by Edward Moran

ments in the making. A territory is a possession of the Union, and is governed by national or federal authorities. The president appoints its officers. but the people elect a legislature, though federal statutes may modify or even annul its laws. The Districts of Alaska and Columbia have no power of self-government. Indians on reservations and non-naturalized inhabitants of the United States are ruled by the federal government. When territories become populous enough and attain industrial or commercial importance, they may, if they wish, become states by forming a constitution, organizing a government and satisfying Congress that they have complied with all requirements of the national constitution. (For the forms of government in Alaska, the District of Columbia, Hawaii, Panama, the Philippines and Porto Rico see these titles).

Political Divisions. The republic politically consists of states, territories and districts and of dependencies or possessions. There are now 48 states, one territory and two districts. The possessions comprise Guantanamo Naval Station, Guam, the Panama zone, the Philippines, Porto Rico, three of the Samoan islands and many islets in the Pacific. The states include 13 that originated in English colonization, six that came into the Union without ever having been territories and 29 that had been territories. The territory is Hawaii; the districts Alaska and Columbia; the states

Alabama
Arizona
Arkansas
California
Colorado
Connecticut
Delaware
Florida
Georgia
Idaho
Illinois
Indiana
Iowa
Kansas
Kentucky
Louisiana
Maine
Maryland
Massachusetts
Michigan
Minnesota
Mississippi
Missouri
Montana
Nebraska
Nevada
New Hampshire
New Jersey
New Mexico
New York
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Vermont
Virginia
Washington
West Virginia
Wisconsin
Wyoming.

(See article on each)

Finance and Law

Though Congress is empowered by the constitution "to lay and collect taxes, duties, imports and excises," it imposes direct taxes only in war or in other exceptional circumstances. The national government derives its revenue almost entirely from duties on imports (see Tariff and Taxes) and from taxes on spirituous liquors, tobacco and other manufactures—especially on luxuries. In 1911 customs yielded $314,497,071; internal revenue $322,529,201; Coinage $5,272,347; public lands $5,731,637; the District of Columbia $7,060,080; tax on national banks $3.503,502; immigrant fund $3,669,816 and fees $5,131,157. The civil service (Congress, courts, the executive and the departments and the District of Columbia) cost $201,968,761; pensions $157,325,160; the army (including improvements of rivers and harbors) $162,357,100; the navy $120,728,786; and the Indians over $21,000,000. (See Army, Banks, Coinage, Consuls, National Debt, Navy, Patent-Office and Post-Office.) The revenues of the states, in distinction from the nation, come from direct taxation, and in the main are collected and spent by local authorities.

Taxes are now levied on incomes in the United States as they have long been in England, a constitutional amendment conferring upon congress the power to levy such taxes having been adopted in February, 1913.

The legal system of the United States is based on English law. Weights and measures also are English, but the use of the metric system is legalized. (See Corporations, Currency, Law, Metric System and Weights and Measures.)

Defence

Previous to the passage of the act of June 3rd, 1916, explained on page 108, the defense of the country was entrusted to a small army (called the regular army) and a navy and to a militia and naval reserve. (See Army, Coast-Defense, Military Schools, Militia, Naval Academy, Naval Reserve, Navy and West Point). Following the declaration of a state of war with Germany on April 6, what is known as the "Selective Conscription Bill" became a law May 18, 1917. It required all men from 21 to 30, inclusive, to register. From this registration enough men were selected to make up, with the forces of the regular army and national guard, the number of men required for service abroad. The men who remained to till the soil and man the factories were regarded as part of the army.

On August 31, 1918, the age limit was, by Act of Congress, extended to include men from 18 to 45.

Education and Religion

The constitution of the Union and the constitutions of the states guarantee the free exercise of *religion*, except where it opposes the constitution, and nowhere is there an established or state church. Every religion is represented -— Buddhism, Confucianism, Islam and others as well as Christianity. In 1911 there were 35,836 ,190 communicants in the different churches; 221,197 organizations; and 172,431 ministers, the Catholics (of all bodies) numbered 13,004,012 communicants. (The Roman church numbered 12,575,085). The Methodists were the largest Evangelical body, all their branches together numbering 6,819,660 communicants. The Baptists came next (5,634,565), and Lutherans (2,289,897) and Presbyterians (1,944,181) contested the third place. Protestant churches are 14 times as numerous as Roman Catholic ones; their ministers 8 times as numerous; and their communicants more than double those of the latter. The Evangelical Sunday-Schools (*q. v.*) numbered over 192,700; their teachers 1,746,000; and their pupils 15,337,000. The Roman Catholic clergy estimate their Sunday-school scholars as 1,000,000. The Jews (*q. v.*) have 143,000 communicants; 1,769 churches; and 1,084 ministers.

Education is the business of the states, not of the nation, and every state has by law established free, public schools. These are largely supplemented by private and parochial schools. In 1910 only 7.7% of the 71,000,000 Americans ten years old and more were unable to read or write. These illiterates numbered 5,517,608. Only 3% of the native white population ten years old and more was illiterate; but 12.8% of the same class foreign-born whites and 30% of that class of the colored population were illiterate. That is, among the 50,989,343 of the first division there were only 1,535,530 illiterates; but among the 12,944,215 of the second class there were 1,650,519 illiterates and among the 7,646,712 of the third group there were 2,331,559 illiterates. Illiteracy in the United States is almost wholly due to immigrants and negroes. The percentage of illiteracy in 1900 was 10.7% and in 1910 7.7%. The United States leads the world in many industries, but in none more successfully than in the making of citizens in its public schools. Though the national government administers no system of education nor appropriates money directly for schools. it has ever since 1787 indirectly assisted education more generously than any other government that ever existed In each new state it has set two square miles of each township six miles square aside as endowments for schools, agricultural colleges or universities. The total has been 75,000,000 acres for schools and universities, including 8,000,000 for colleges of agriculture. It also maintains a bureau of education (see DEPARTMENT OF THE INTERIOR), which collects statistics and publishes reports The state systems of education are so similar that in effect they make a national system of American education In 1909-10 there were 17,813,852 children in the public schools, which cost $426,250,434. The total number of pupils in *all* institutions was 19,811,922. Universities and colleges numbered 581, of which 339 were coeducational and 145 for men only. There also were 97 colleges for women The colleges and universities had 183,572 students and and an aggregate of 55,000,000 volumes in their libraries.

As for schools of music or art, almost every city has at least one. See COLLEGES, EDUCATION (MODERN), EDUCATION (STATE-AID), SCHOOLS and UNIVERSITIES; articles on other educational topics; and articles on the states and on single universities or colleges.

ART AND LITERATURE

See FINE ARTS, LITERATURE (AMERICAN) and SCULPTURE.

POPULATION OF THE UNITED STATES AND ITS POSSESSIONS.

The population of Continental United States in 1910 was 91,972,266. Including Alaska, Hawaii, Porto Rico and Philippine Islands, and adding estimates for the islands of Guam and Samoa and the Canal Zone, the total population of the United States and possessions was about 101,100,000. The original inhabitants were Indians (*q. v.*), of whom there are 291,581.

According to the census of 1920 the population of the United States is 105,708,771; of its outlying possessions 12,148,738. Statistics of cities and states are listed under the individual articles relating to them. But it is interesting to note the gradual growth of the twenty-five largest cities and a comparative table will assist us in the comparison. The cities are arranged in order of their present standing. You can see that some of the cities maintained other comparative ratings in the past.

City	1790	1810	1830
1 New York	49,491	119,734	242,278
2 Chicago			
3 Philadelphia	28,522	53,722	80,462
4 Detroit			2,222
5 Cleveland			1,076
6 St. Louis			
7 Boston	18,320	33,787	61,392
8 Baltimore	13,503	46,555	80,620
9 Pittsburgh		4,768	15,369
10 Los Angeles			
11 Buffalo			8,668
12 San Francisco			
13 Milwaukee			
14 Washington		8,208	18,826
15 Newark			
16 Cincinnati		2,540	24,831
17 New Orleans		17,242	46,082
18 Minneapolis			
19 Kansas City, Mo.			
20 Seattle			
21 Indianapolis			
22 Jersey City			
23 Rochester			9,207
24 Portland, Ore.			
25 Denver			

A series of periods more nearly the present show the following figures:

Population

City	1860	1890	1930
1 New York.........	1,174,779	2,507,414	6,930,460
2 Chicago............	109,260	1,099,850	3,376,438
3 Philadelphia........	565,529	1,046,964	1,950,961
4 Detroit.............	45,619	205,876	1,568,662
5 Los Angeles........	4,385	50,395	1,238,048
6 Cleveland..........	43,417	261,353	900,429
7 St. Louis...........	160,773	451,770	821,960
8 Baltimore..........	212,418	434,439	804,874
9 Boston..............	177,840	448,477	781,188
10 Pittsburgh..........	77,923	343,904	669,817
11 San Francisco.......	56,802	298,907	634,394
12 Milwaukee..........	45,246	204,468	578,249
13 Buffalo.............	81,129	255,664	573,076
14 Washington, D. C...	61,122	230,392	486,869
15 Minneapolis........	2,564	164,738	464,356
16 New Orleans.......	168,675	242,039	458,762
17 Cincinnati..........	161,044	296,908	451,160
18 Newark............	71,941	181,830	442,337
19 Kansas City, Mo.....	4,418	132,716	399,746
20 Seattle..............	....	42,837	365,583
21 Indianapolis........	18,611	105,436	364,161
22 Rochester, N. Y.....	48,204	133,896	328,132
23 Jersey City.........	29,226	163,003	316,715
24 Louisville..........	68,033	161,129	307,745
25 Portland, Ore.......	2,874	46,385	301,815

History

The story of our country naturally falls into three parts. These are the colonial period, the revolutionary epoch and the era of union. The first extends from 1576 to 1763; the second to 1789; and the third to the present day. But the first overlaps the second, because the revolution began while the United States was colonies; and the third runs back into the second, because American nationality and federal union began in revolution. Only the briefest account of American history can here be attempted. So it is suggested to the student, who wants to inform himself more fully, that he not only consult the articles named at the end of each paragraph but see articles on all the men and places and events mentioned within each paragraph itself.

The Colonial Period. This is marked by colonization (1576–1750), by a struggle for expansion (1750–63) and by attempts at union (1763–75). English colonization began in 1585, when Raleigh planted settlements in North Carolina, and in 1602, when Gosnold placed colonists on islands off Massachusetts. It ended in 1733, when Oglethorpe founded Georgia. Permanent settlement came in 1607 in Virginia; in 1612 (by the Dutch) in New York; in 1616 in Maine; and in 1620 in Massachusetts. New Hampshire (1623); Maryland (1634); Connecticut and Rhode Island (1636); Delaware (1638, by Sweden); New Jersey (in 1640 by Swedes, before 1650 by Dutch and in 1664 by Englishmen); North Carolina (by Virginians before 1650, by English colonists in 1663); South Carolina (1670); and Pennsylvania (1661, though Swedes had founded settlements there in 1627 and Englishmen in 1641) successively became permanently settled. The separate histories of these colonies are given in articles under titles as above. They were governed by charters to the colonists or by proprietors or by the king, but all in effect were representative democracies. Life had all the hardships of existence in any new country, and these were increased by the difficulties of communication The southern planters, however, enjoyed a luxury that the middle colonies and New England could not then have. Nevertheless, as early as 1760 material prosperity abounded everywhere. In New England education was general; in the central colonies special classes had good education; and in the south the better class received education of a high order. Six colleges — Harvard, William and Mary, Yale, Princeton, Pennsylvania and King's (now Columbia) — were founded before 1760. Religious freedom prevailed to an exceptional extent. Thirteen governments (Maine being included in Massachusetts and Vermont in New Hampshire and New York) stretched from French Canada to Spanish Florida and from the Atlantic into the Appalachians. Their people numbered 1,250,000; had tamed the wilderness; had survived many struggles with the Indians; and were beginning to swarm across the mountains into the fertile valleys of the west. They were not unaware of their power. In 1690 and in 1710 New England had captured Port Royal, Nova Scotia, from France, and in 1745 it took Louisbourg, the strongest of American fortresses, on Cape Breton Island. But the colonists feared France in Canada (*q. v.*) and the French alliance with the Indians of the west. In 1749–54 came the crisis in the conflict for the continent, when the Virginians entered the Ohio Valley at Pittsburgh and Washington (1755) fought with and surrendered to the French. (See French and Indian War.) In 1763 France ceded its American possessions (except New Orleans) from the Mexican Gulf to the Arctic Ocean and from the Appalachians to the Mississippi to Great Britain. It also ceded the Louisiana country between the Mississippi and the Rockies to Spain. So the colonists made good their claim to the eastern half of the Mississippi Valley, and cleared the way for the march of the Americans of the 19th century from the Atlantic to the Pacific. The French and Indian War showed the colonies their full strength, trained the soldiers and generals of the War for Independence and first united all the colonies. But its last result was to kill all sense of dependence on England. (See Albany Congress; Andros; Bacon, Nat.; Baltimore, Lord; Berkeley, Wm.; Blue Laws, Boone, Dan

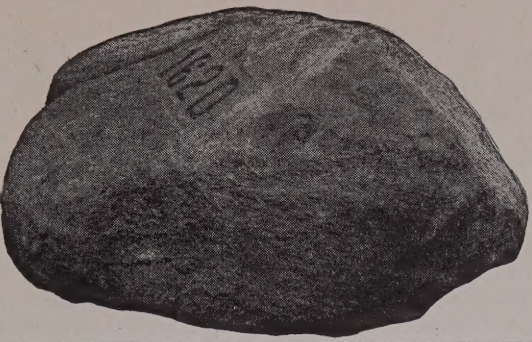
Braddock, Ed.; Carteret, Geo.; Claiborne, Wm.; Colleges; Culpeper; Delaware, Lord; Endicott; Gosnold; Indians; Jamestown; Louisbourg; La Salle; Penn; Pilgrims; Pontiac; Puritans; Raleigh, Sir W.; Smith, Capt., of Virginia; and Seven Years' War.

The Revolutionary Epoch. The English government, to repay the expenses of the war with France, taxed the American colonies heavily. Since 1651 it had hampered their commerce and manufactures, and Parliament's legislation was one of the direct causes of the American Revolution, but acts in restraint of trade were not vigorously and universally enforced until 1761. The colonists acknowledged that it was only fair that they should pay their share of the cost of their protection by England, but denied that Parliament, in which they were not represented, had the right to tax them. In 1761 Otis of Massachusetts declared that "an act of Parliament against the constitution is void," and the colonists resisted Parliament's writs of assistance.

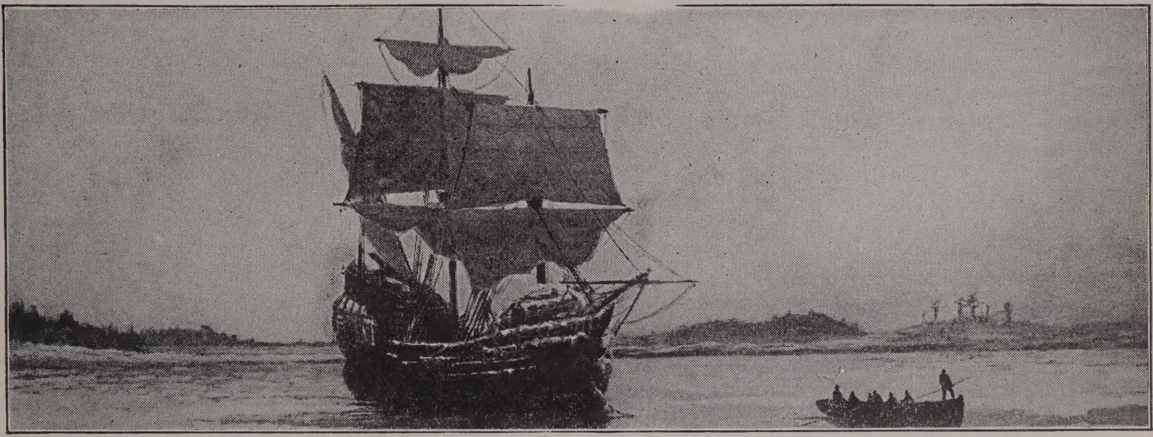
In 1765 Parliament passed a stamp-act that taxed the colonists without their consent, devoted the American revenue to the support of a standing army, and intended this army to maintain taxation. The Virginian assembly, the people's house of the legislature, declared that each colony had the right to make its laws and to lay and spend the taxes; the Massachusetts assembly proposed an American congress of representatives from every colony, appointing a committee to secure united action. The congress met, and appealed to the king and Parliament. The stamp-act (*q. v*) was repealed, but American imports were taxed (1767) and the British authorities goaded the colonists further and further. In 1773 the colonial legislatures appointed "committees of correspondence" to keep up union of action with one another. A national spirit had been born. When the people of Boston threw a cargo of tea into the water, "the whole continent applauded." In 1774 Boston was closed to commerce and the charter of Massachusetts changed. These acts of the British government made war only a question of time. They crystallized every element of union in the colonies. The Virginians suggested, and the men of Massachusetts called, another congress which met at Philadelphia in September of 1774. This was the first continental congress (*q. v.*), the first really national body in American history. It addressed the English people and the king, and issued a Declaration of Rights of the colonists. It approved Massachusetts' opposition to Parliament and resolved that, if execution of the acts "*by force* "should be attempted, "all America ought to support their opposition." Congress summoned a new Congress which convened at Philadelphia in May of 1775. The British government now ordered General Gage to reduce the colonies to submission, and he at once took possession of Boston Neck and fortified it.

On April 19, 1775, at Concord and Lexington, Mass., war began, and with it the national existence, politically, of the United States. The people's or lower house of every colony took the government. Congress met as the representative of an united people, and all the colonists supported Massachusetts. The articles of association had already substituted government by the people for government by the legislatures, and the general union affected all our after history. Congress was sustained by the united people without regard to colonial governments, but did not take the national powers that were within its grasp. Congress adopted the Massachusetts miltia around Boston as the nucleus of the national army, and Washington was appointed its commander-in-chief. The day of his being commissioned is the day of the battle of Bunker Hill, which was one of the decisive battles of the war, because it showed that American soldiers would stand their ground. In March of 1776 Washington compelled the British to quit Boston. The war was unpopular in England, the British fighting but half-heartedly till 1778. In June of 1776 Richard Henry Lee of Virginia moved that Congress declare independence, and in July it "resolved that these united colonies are and of right ought to be free and independent states; that they are absolved from all allegiance to the British crown; and that all political connection between them and Great Britain is and ought to be totally dissolved." On July 4 Jefferson's Declaration of Independence was adopted by Congress, and the United States' legal existence began. Meanwhile the war was going against the new nation, for Washington was driven out of Long Island, New York and New Jersey, and the British controlled the Hudson's mouth. But on Dec. 26, 1776, at Trenton, N. J., Washington struck the blow that proved the turning-point of the war, and on Jan. 4, 1777, he made Morristown, N. J., his headquarters, and there these really remained through almost all the rest of the war. De Kalb of Germany, Kosciusko of Poland and La Fayette of France already were serving in the American army; Pulaski and Steuben came later; and in 1777 Franklin in France made the government in all but name an ally of the United States. On Oct. 17, 1777, Burgoyne, a British general who had tried to cut off New England from the other colonies by coming down the Hudson from Canada, was forced to surrender his army at Saratoga. This success won the United States a treaty of alliance with France. Howe captured

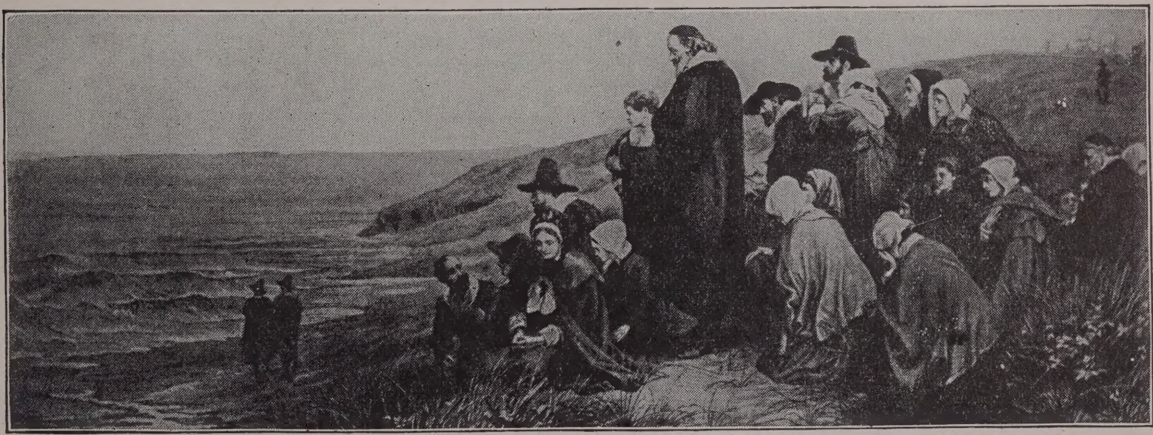
SCENES IN THE PILGRIM STORY



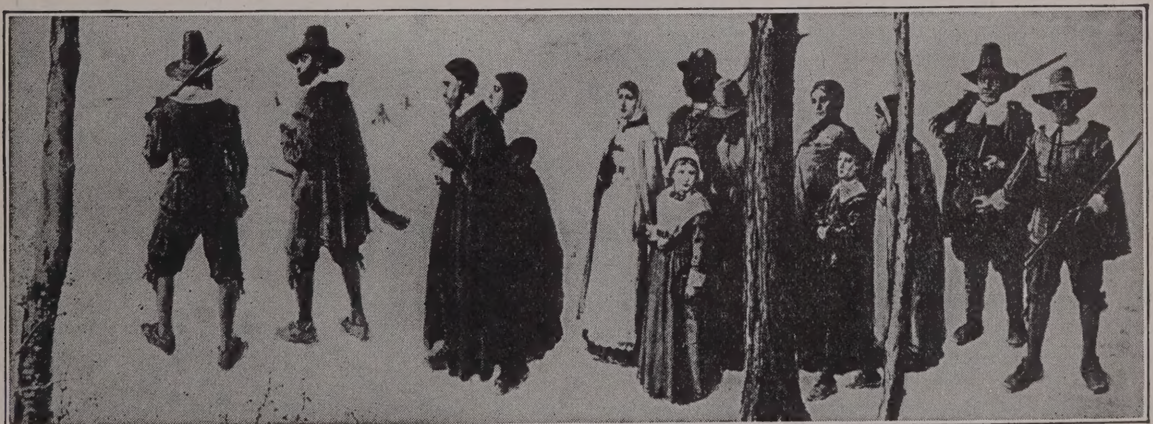
PROTECTED BY A GRANITE CANOPY AND BY BARS TO KEEP RELIC HUNTERS FROM CHIPPING IT AWAY, THE ROCK ON WHICH THE PILGRIMS LANDED STILL LIES AT THE WATER'S EDGE AT PLYMOUTH WITH THE DATE OF THE LANDING CARVED UPON IT.



The Mayflower has just arrived and its passengers are landing on the "bleak New England shores."



The Pilgrims sadly watching the Mayflower as it sails back toward the comfortable homes in old England which they have given up for "freedom to worship God."



Even when they went to church the Pilgrims were obliged to go armed to protect themselves against attacks by the Indians.

Philadelphia, the capital, in 1777, and Washington, though he had made his army capable of taking the offensive, spent a terrible winter at Valley Forge, Pa. In the summer, however, of 1778 the end began. There were no more important events at the north, except unsuccessful attempts to recover Newport, R. I., Wayne's capture of Stony Point and Arnold's treason at West Point, for Washington at Morristown, N. J., watched New York and protected Philadelphia. In the winter of 1778–9 Clark of Kentucky, under the authority of Virginia, won the west for the United States. The English, hopeless of success in the north and east, transferred the war to the south, mistakenly imagining that the slaves would rise against their masters. In 1778 they captured Savannah and Georgia, in 1780 Charleston and South Carolina. But Greene, the only great American general developed by the war, except Washington, saved the south (1781), though never winning a battle, and he was ably seconded by Morgan, Marion and Sumter. The English held only Charleston, New York City and Savannah, and the country at large had long been at peace. In June of 1781 Cornwallis chose Yorktown, Va., as a permanent post on Chesapeake Bay. But Washington, watching Clinton at New York, had been reinforced by 6,000 French troops. A French fleet was to enter the Chesapeake. Washington deceived Clinton into thinking that he was to attack New York City. Clinton weakened Cornwallis by withdrawing part of his troops. Washington moved down the Hudson, kept Clinton in ignorance to the last moment, suddenly swung aside through New Jersey and Philadelphia, and hurried the allied armies down Chesapeake Bay. The French fleet had early in September driven off the British fleet supporting Cornwallis. The American and French armies invested his position in front, the French fleet his rear. Besieged and starved, the English fleet unable to reach him, he surrendered on Oct. 19, 1781. "My God!" cried Lord North, when the news reached him, throwing up his hands; "it is all over." It was. The moral effect of the capture of Cornwallis practically ended the fighting. On Nov. 30, 1782, Great Britain acknowledged the independence of the United States, and on Sept. 3, 1783, peace was definitively concluded. (See ADAMS, JOHN; ADAMS, SAM.; ANDRÉ; ARNOLD, BENEDICT; BUNKER HILL; BURGOYNE, JOHN; CINCINNATI, SOC. OF; CLARK, GEO. R.; CORNWALLIS; DANE, NATHAN; DAUGHTERS OF THE REVOLUTION; DECLARATION OF INDEPENDENCE; FRANKLIN, BEN.; GREENE, NAT.; HAMILTON, A.; JEFFERSON, THOS.; LEE, R. H.; MORRIS, ROB.; OTIS, JAMES; PAINE, THOS.; PARLIAMENT; SARATOGA; TRENTON; VALLEY FORGE; WASHINGTON, GEO.; and YORKTOWN.)

The United States, which had first called itself by that name in the Declaration of Independence, began with a territory bounded on the north nearly as now, on the west by the Mississippi to the latitude of Florida and on the south by (then Spanish) Florida. But the country, though a union, was a confederated union, not a federal union. For in 1775–6 the colonies, as soon as imminent danger disappeared, deprived Congress of so much power that they endangered the nation's life. The new legislatures took the power of naming and recalling the delegates to Congress; the thought of nationality grew dim; and the colonies asserted that they were sovereign states. In 1777 articles (*q. v.*) of confederation were adopted which made the new nation merely "a firm league of friendship" between sovereign states Congress at best hardly had more than advisory power. The states were to be sovereign in everything. The result was inefficiency in the management of public affairs. So in 1787, "we, the people of the United States, in order to form a more perfect union" held a constitutional convention which met at Philadelphia. This was the ablest body that had assembled since 1775, and Washington presided. It formed the present constitution (which has already been described), nine states adopted it by June of 1788, and the new government began. This is the federal union, in which the people are the sovereign. New York was made the capital, Washington elected president unanimously and John Adams made vice-president (1789).

In 1787, too, the continental Congress had passed an ordinance, the famous Ordinance (*q. v.*) of 1787, in regard to the new lands of the United States between the states and the Mississippi, the states having ceded their lands there to the United States. These lands played no small part in bringing about the federal union, and the ordinance proved of immense importance to the future of the United States and to its politics.

It is difficult to realize how poor and weak our country was It owed $42,000,000, but numbered only 3,929,214 people. It was an almost exclusively agricultural country. Communication was slow and painful. Distances were immense when there were neither railroads nor steamships, and this increased the labor of administering such a country under a single government. The states were jealous of one another and of the Union. The people themselves had changed since 1775, and not for the better. The things that saved the nation were the picked men that led it and created a strong government; the keen and intelligent interest of its citizens in politics; and the outlet to the new domain in the west. The states yielded their claims here to the Union, free navigation of the Mississippi was secured from Spain (1795), and emigration began to flow freely across the Alleghanies. The Federalist party controlled the first two Congresses, and organized the government much as it is to-day. Protection of American manufactures was begun, the national debt funded, the debts of the states being assumed as part of it, a national bank founded, and Washington City appointed to be the capital after 1800. John Adams was elected president and Thomas Jefferson vice-president in 1797. But the Federal party passed three laws about aliens and sedition that the Anti-Federalists (then called Republicans, but Democrats now) considered political persecution. In 1801 the Anti-Federalists came into power in the election of Thomas Jefferson as president. (See ALIEN AND SEDITION LAWS; HABEAS CORPUS, HISTORY, INDIANS; INTERNATIONAL LAW; JAY, JOHN; JURY, TRIAL BY, LANDS; MINT, MONEY; NATURALIZATION; NAVIGATION LAWS; NEUTRALITY; POLITICAL ECONOMY; POLITICAL PARTIES, POOR LAWS; PRESIDENT; PRESS, FREEDOM OF; PROTECTION; SUFFRAGE; TARIFF, TAXES; and WHITE HOUSE).

Meanwhile Vermont (179.), Kentucky (1792) and Tennessee (1796) had become states. Whitney (1793) had invented the cotton-gin, which made cotton-growing profitable and slave-labor apparently necessary, and so played a part in politics. "The West" had begun to be a factor in our growth, for the Indians of Ohio had been compelled to surrender their lands and the safety with which settlement could be made gave it a new impetus. The rising spirit of migration inspired the people to try to improve the communications, and attempts were made to introduce turnpikes and canals. Our population (1800) had become 5,308,483.

Jefferson, though believing that the constitution should be interpreted narrowly and the powers of the national government severely restricted, was forced by events to do things that not even the Federalists had done. He doubted if the nation had the right to buy and hold territory, but in 1803 he bought the Louisiana country, thus more than doubling the area of the United States. He also sent Lewis and Clark to explore the Oregon country. In 1805 the Barbary pirates were reduced to submission. In 1807 an embargo act forbade foreign commerce altogether, in order to starve Great Britain into fair treatment of the United States. It injured American commerce greatly, but did nothing else; and the relations between England and the United States grew more and more strained. Ohio had become a state in 1803; Fulton had made steam a commercial success in navigation (1807), so that within four years steamers plowed the western rivers and emigration crossed the Mississippi; and the slave-trade was abolished (1808). (See EMBARGO ACT; LEWIS AND CLARK; and LOUISIANA PURCHASE).

Madison succeeded Jefferson in 1809, and tried to carry out Jefferson's policy, but in 1812 had to declare war against England. The United States could no longer tolerate the British claim of sovereignty over naturalized American citizens, the claim to the right to search the ships of neutrals, the claim of a right to impress her subjects as seamen, wherever found. On land the war was disastrous, as a whole, for America, though the battles of Chippewa, Lundy's Lane and New Orleans were American victories; but at sea and on the lakes it was successful, the United States winning 15 out of 18 engagements. Peace was renewed on Dec. 24, 1814. Nothing was said about search and impressment, but Britain never again searched American ships or impressed American seamen. The war strengthened the national government and took the Democratic party to many of the positions of the Federalists. The supreme court, John Marshall of Virginia being chief-justice (1801–35), also took advanced positions in favor of the federal government. Protection to American industries was renewed, and inventive genius grew rapidly. By 1810 our population had grown to 7,239,881. Louisiana had become a state in 1812. (See EMIGRATION; HARTFORD CONVENTION; MARSHALL, JOHN; and TECUMSEH).

Madison was in 1817 succeeded by Monroe, and the old Democratic party became two parties (1825). Clay was the leader of the new Democracy, which called itself Whigs and took in the remains of the Federal party; Calhoun and Jackson of the party which now formally called itself the Democratic party. The westward movement of population was growing more and more, and Indiana, Mississippi, Illinois, Alabama, Maine and Missouri all joined the Union during 1816–21. The population (1820) had become 9,638,453. All our territory east of the Mississippi (except the northern part of the old northwest) had become states, Florida had been bought from Spain, and the Indians between Georgia and the Mississippi had ceded their lands and left this territory open for settlement. Commerce between the east and the west was facilitated in 1825 by the completion of the Erie Canal. In 1823 Monroe promulgated the Monroe doctrine.

John Quincy Adams (*q. v.*) in 1825 followed Monroe, being elected as a National Republican. He upheld the system of internal improvements and of protection to manufactures, the tariff of 1828 being extremely protectionist. (See ERA OF GOOD FEELING; MISSOURI; SLAVERY; and WHIGS).

Jackson became president in 1829. Calhoun of South Carolina held that any state, if it considered a law of Congress unconstitutional, might suspend or nullify it. South Carolina declared the tariff of 1832 null, but Jackson compelled it to repeal the ordinance of nullification. He also deprived the United States Bank of the public funds. During 1829–37 all the machinery of American political parties came into being In 1826 the railroads had begun and they made the growth of the west far more speedy. Our population in 1830 was 12,866,020. Anthracite was now at last used with commercial success. Steam navigation across the Atlantic was established (1838), the telegraph came in 1844, and the modern era of the United States opened. In 1835 the public debt was extinguished, and the surplus distributed among the states. In 1837 came a serious financial panic. (See Black Hawk; Calhoun, John C.; Clay, Henry; Crockett, Davy; Hayne, R. Y.; Houston, Sam.; Jackson, Andrew; Journalism; Kent, James; Newspapers; South Carolina; Sates' Rights; Texas; Story, Jos.; and Webster, Daniel.)

Van Buren succeeded Jackson in 1837, and replaced the national bank by the government treasury, but the hard times enabled the Whigs to elect William Henry Harrison. As he died soon after his inauguration (1841), Vice-President Tyler became president, and the Democrats rather than the Whigs ruled. They then elected Polk (1845–9) and Texas was annexed in 1845. War with Mexico followed (1846–8), America took possession of California and New Mexico, and Taylor and Scott won every battle with the Mexicans. Peace was concluded in 1848, Mexico ceding what now are Arizona, California, New Mexico, Nevada and Utah. The United States paid Mexico $15,000,000 and assumed $3,000,000 of Mexican debts to American citizens. At the same time (1844–6) the United States obtained the Oregon country (between the Rockies, Canada, the Pacific and California, Nevada and Utah) from England. Texan annexation had added 375,000 square miles to the country, the Mexican cession 500,000 and the Oregon country about 250,000. The United States, when the Gadsden purchase (1853) rectified the frontier between Mexico and New Mexico, had taken the dimensions it retained till 1867. (See California; Compromise of 1850; Fugitive Slave Law; Gadsden Purchase; Mexican War; Mexico; Mormons; Omnibus Bill; and Utah.)

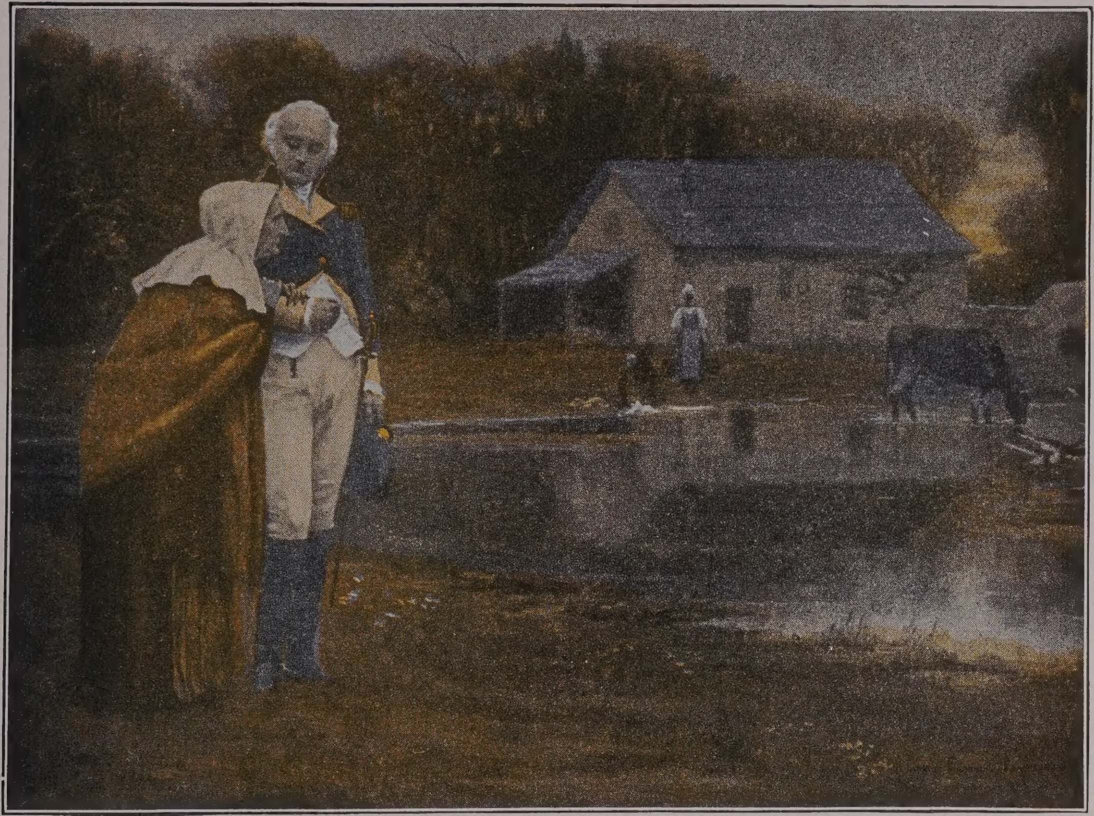
But the discovery of gold in California (1848) and the non-existence of slavery in the Mexican lands brought political troubles. The Missouri compromise (1820) had prohibited slavery (except in Missouri) in the Louisiana country north of 36° 30′. Agitators at the north at once opened public opposition to slavery, and in 1831 a movement for the abolition of it began. (See Emancipation, Garrison and Phillips.) In 1820 the south and the north had already drifted apart in their views as to slavery, state sovereignty and the Union. New economic conditions controlled the north and the west, which the south hardly felt, and these widened the gulf between the sections. California applied for admission as a state, and forbade slavery. If it and other states from the new territory were to be free states, the slave-states would lose power and slavery would be endangered. In 1850 California was admitted as a free state, but a fugitive-slave law was passed.

Since 1830 material development had been extraordinary. The sudden increase of wealth gave fresh impetus to the spirit of invention. Goodyear's method of vulcanizing rubber (1839) came into universal use. McCormick invented the reaper (1834), which has been hardly less important to the country than the railroad, enabling it to fill the west rapidly and making western farms profitable. In 1846 came the power-loom, a successful sewing-machine and the surgical use of anesthetics. Next year brought the rotary press for printing. In 1847, too, European immigration first became an important factor in the making of the country. Its population in 1840 was 17,069,453. In 1850 it had become 23,191,876.

The Whigs elected Taylor (1849), who, however, died in July of 1850 and was succeeded by Fillmore. The Democratic party had put forward the doctrine of squatter sovereignty or the proposal that the people of each territory be left to settle the question of slavery for themselves. The Whigs had ignored or evaded the problem. In 1854 Kansas and Nebraska were organized as territories, both being in territory where the Missouri compromise had prohibited slavery. The compromise was now repealed and the question of slavery was left to the people of these territories. The south and the north vied to see whether these people should be southerners and favor slavery, or northerners and favor freedom. Civil war in Kansas ensued, but the antislavery settlers were in a large majority and Kansas finally (1861) became a free state. Meanwhile a new party, an antislavery party only so far as it aimed to exclude slavery from the national territory, had arisen and had captured the popular branch of Congress. The Democratic party, which since 1852 had practically been the sole party, was faced by the Republican party. (See Chase, Salmon P.; Davis, Jefferson, Douglas, S. A.; Kansas; Lincoln, Abraham; Seward, Wm. H.; Stanton, E. M.; Sumner, Chas.; and Underground Railroad.)

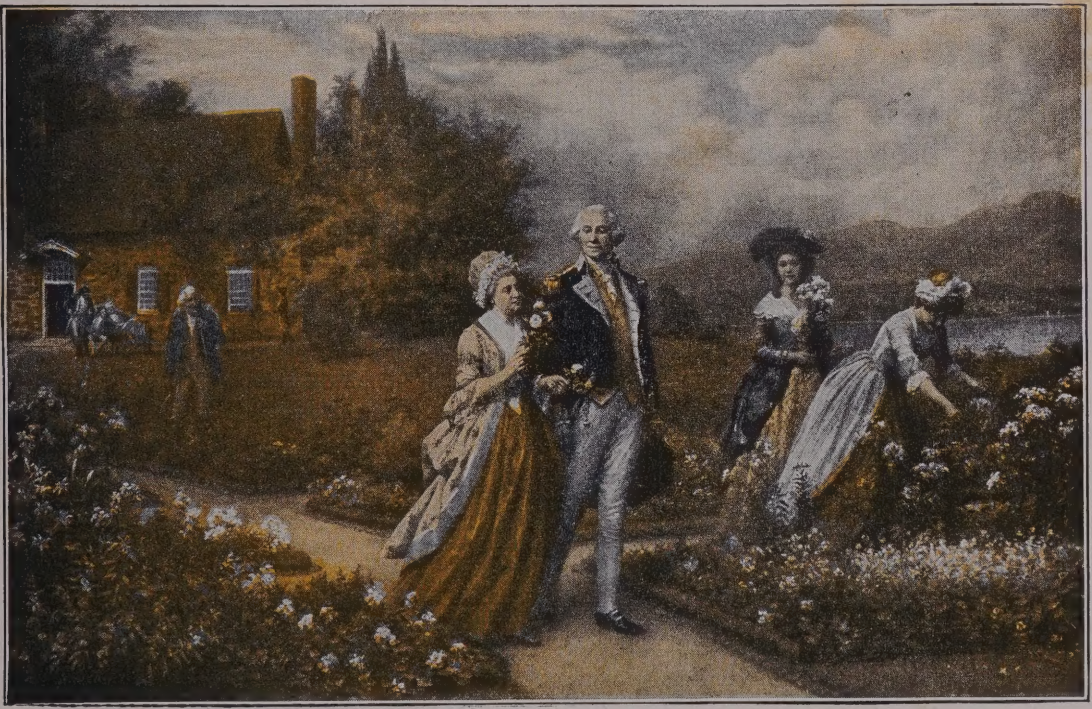
The Democrats had elected Franklin

The Story of Washington in Art



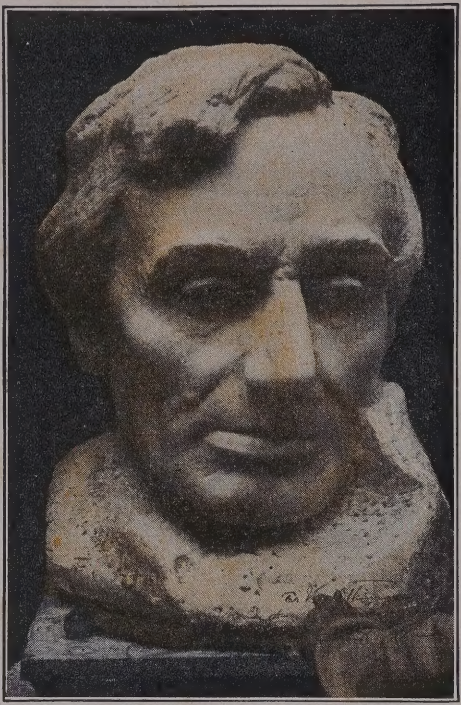
By Permission of Taber-Prang Art Co., Springfield, Mass.
Washington and His Mother, by L. E. Fournier (French b. 1839)

THIS picture shows Washington visiting his mother after the final triumph of the American army at Yorktown. Mother and son had not seen each other for seven years. "She welcomed him," says Lossing, "with a warm embrace, called him 'George,' spoke much of old times and friends but said never a word of his glories. He was simply her good son George who had done his duty."

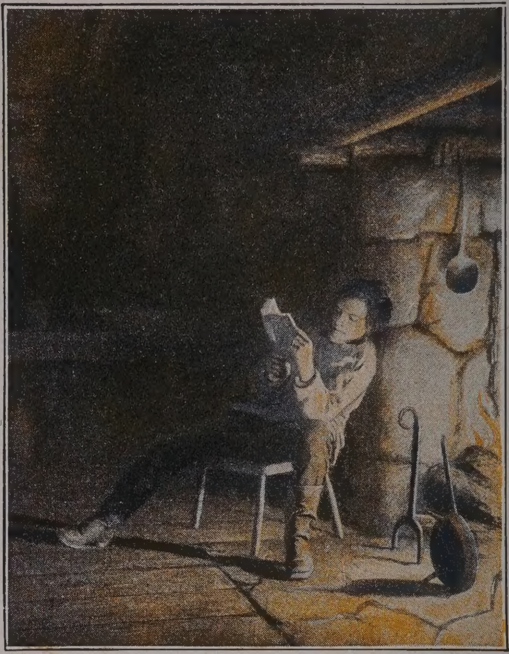


© C. Klackner, New York
Washington in Headquarters at Newburgh, by Jennie Browncombe (American b. 1850)

Story of Lincoln in Art



© *Gutzon Borglum. By Permission of the Artist.*
Lincoln, by Gutzon Borglum (American b. 1867)



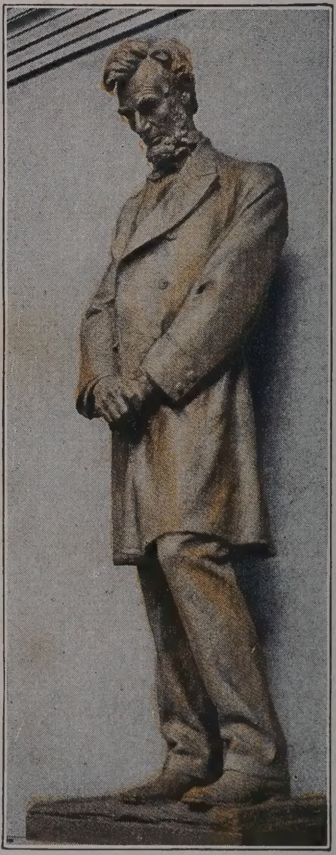
© *Horace K. Turner Co., Boston*
Lincoln's Boyhood, by Eastman Johnson (American b. 1824)

THIS page shows how three eminent American artists have told about the life and character of Lincoln. Johnson shows him laying the foundations of his greatness. In the quaint language of Lincoln's cousin, and playmate, Dennis Hanks: "Seems now I never seen Abe after he was twelve 'at he didn't have a book some'rs-'round. A'nt Sairy'd never let the children pester him. She always sed Abe was goin' to be a great man some day an' she w'an't goin' t' have him hendered." This painting is in the library of Berea College, Berea, Ky.

After you study his picture turn to Mrs. Atkinson's biography of Lincoln on page 1073 and you will find a list of some of the books Lincoln read. And there you can read again his immortal Gettysburg's speech and of the simple, quiet way in which it was delivered. The sculptor has caught with his wonderful skill the very spirit of the occasion and the man. This statue is at Lincoln, Neb. French's work is noted for its serenity and distinction and his intense sympathy with his subject.

The work of both French and Borglum has given them a place among the most eminent of modern sculptors. The Lincoln head is in the capitol at Washington. As you look at this face, can you not read the same thought contained in our biography of Lincoln:

"He had the brain of a sage, the forehead of a prophet, the inflexible purpose of the reformer, the tender heart of a mother."



Lincoln at Gettysburg, by D. C. French (American b. 1850)

Pierce (1853) and in 1857 James Buchanan, another Democratic president, succeeded him. In 1857 Chief-Justice Taney of the Supreme Court decided that the national constitution considered slaves, not persons, but property; that the Missouri compromise had been unconstitutional; that Congress was bound to protect property; and that Congress, therefore, ought to and must protect slavery in the national territory. The South maintained that its view as to the duty of Congress was confirmed, the north flouted the decision (the Dred Scott decision), and disunion came in sight. But the south and the north had so diverged in population, resources and wealth, that in 1860 the free states were 19,000,000 to the slave states' 12,000,000. (The total population was 31,443,321.) The Democratic party split in 1860, the northern or Douglas Democrats resting on squatter sovereignty and the compromise of 1850, but willing to accept the decision of the Supreme Court, the southern Democrats demanding protection from Congress for slavery in the territories. The Republicans demanded that Congress prohibit slavery in the national domain. Abraham Lincoln, their candidate, was elected. South Carolina on Dec. 20, 1860, seceded and prepared for war, and by Feb. 1, 1861, had been followed by Mississippi, Florida, Alabama, Georgia, Louisiana and Texas. On Feb. 4 they formed the Confederate States. In the spring North Carolina, Arkansas, Virginia and Tennessee joined the Confederacy. On April 14, 1861, South Carolina attacked Fort Sumter, and the Civil War began. It closed on April 9, 1865, at Appomattox, Va. It had engaged 2,780,000 Federal and 1,000,000 Confederate troops; cost 500,000 lives; encumbered the nation with a debt of $2,800,000,000; and almost ruined the south.

For details of this bitter and exhausting struggle the reader is referred to accounts (under proper titles) of the important battles, as Bull Run, Donelson, Shiloh, Stone River, Antietam, Fredericksburg, Gettysburg, Vicksburg, Chickamauga, the Wilderness, Spottsylvania, Mission Ridge and Atlanta, as, also, to sketches of the great leaders, as Lincoln, Grant, Sherman, Thomas, Sheridan, Logan and others of the Federal side and Davis, Lee, Beauregard, Johnston, Jackson and others of the Confederates. It should be noted, however, that, while the final issue was determined in the results of these great battles, any adequate understanding of the intensity and strain of this titanic struggle must be sought in the story of hundreds of minor engagements, for the record shows that during 1862–4 every day saw a clash of arms, and it is a literal fact that the roar of artillery and the rattle of musketry did not cease for one day during these dreadful years. (See CONFEDERATE STATES; DECORATION DAY; DRAFT RIOTS; EMANCIPATION PROCLAMATION; JOHNSON, ANDREW; KUKLUX KLAN; NEGRO EDUCATION; PEACE SOCIETIES; RECONSTRUCTION; REPUBLIC, GRAND ARMY OF THE; and THANKSGIVING DAY).

Reconstruction ensued, and on Jan. 30, 1871, the last of the seceding states was recognized and reinstated by Congress. On Jan. 1, 1863, the proclamation of emancipation from slavery had been issued; in 1865 the thirteenth amendment to the constitution abolished it forever; and in 1870 the fifteenth amendment was adopted, which provided that "the right of citizens of the United States to vote shall not be denied or abridged by the United States or by any state on account of race, color or previous condition of servitude." By 1897 the debt, in spite of enormous pensions yearly to survivors from the Federal forces, had been reduced nearly half. In 1867 Alaska had been purchased from Russia and France had been compelled to withdraw from Mexico, which was thus enabled to overthrow Maximilian.

Andrew Johnson, who had been made president by Lincoln's death, was succeeded in 1869 by General Grant. During his administration the *Alabama* claims against England were settled by arbitration in favor ot the United States, the Union and Central Pacific Railroads were completed, the civil service was reformed, the panic of 1873 occurred, and the centenary of the independence of the United States was celebrated by an international exposition. In 1870 the population had grown to 38,558,371. (See ALABAMA CLAIMS; ARBITRATION; EXPOSITIONS; LABOR; LABOR PARTIES; PEONAGE; RED CROSS SOCIETIES; SPECIE PAYMENTS; and WOMAN'S RIGHTS.)

In 1877 Rutherford B. Hayes was inaugurated president. He immediately withdrew the last Federal troops from the south, and the government of the southern states by the negroes and by northern office-holders ceased. Specie-payments were resumed. James A. Garfield succeeded him in 1881, but was assassinated, Vice-President Chester A. Arthur succeeding to the presidency. Chinese immigration and polygamy were prohibited. By 1880 the population had become 50,155,783.

The Democratic party came into power again in 1885, when Grover Cleveland became president. He extended the reform of the civil service to a great number of offices, and urged radical changes in the tariff. Another antipolygamy law and another bill for the exclusion of the Chinese were passed. The succession to the presidency was regulated, as was also interstate commerce. (See IMMIGRATION BUREAU; INHERITANCE TAX; INTERSTATE COMMERCE; RECIPROCITY; SINGLE TAX; STRIKES; and TRADE-UNIONS.)

The Republicans elected Benjamin Harrison (1889-92) as Cleveland's successor. Commercial and political relations with Central and South America were strengthened and extended, as was the policy of reciprocity, though a high tariff was enacted. The pension system was enlarged, the law for free coinage of silver repealed and another for limited coinage substituted. A revolution occurred in Hawaii, the native monarchy was overthrown, and the new government applied for annexation to the United States. Congress passed a bill for the annexation of Hawaii, but Cleveland was elected again, and annexation did not occur until 1898. In 1890 our people numbered 62,947,714. (See HAWAII; and INCOME TAX.)

Cleveland's second term opened with the financial panic of 1893, the establishment of a low tariff and efforts to restore Hawaii to its native rulers. A dispute between Great Britain and Venezuela was settled at the instance of the United States by referring it to a tribunal of arbitration. The fourth centenary of the discovery of America was celebrated by the Columbian Exposition. The difficulty with England and Canada as to sealing in Bering Sea was settled amicably. The president extended the reform of the civil service, and used Federal troops to suppress a strike that interfered with interstate commerce.

The Republican party returned to power by the election and reëlection of William McKinley (1897–1901) and the succeeding elections of Theodore Roosevelt (1904) and William Howard Taft (1908). The political and financial question in 1896 was whether the United States should adopt gold alone or gold and silver as its monetary standard, and in 1900 gold was by law established as the standard of currency. A high tariff was also restored. In 1898 war with Spain broke out, and resulted in the acquisition of Porto Rico and the Philippines (*q. v.*). In 1900 the United States joined the powers of Europe in suppressing a rebellion in China. On Sept. 6, 1901, President McKinley was assassinated, and Vice-President Roosevelt (*q. v.*) became president. The eight years of his presidency were marked by great prosperity and expansion and by the advance of the nation to commanding position as a world-power. Among important affairs demanding the attention of Congress and the executive were the building of Panama Canal (*q. v.*); the reclamation of great areas of arid lands by irrigation (*q. v.*); the husbanding of the national resources through the cultivation of forests and the establishment of forest-reserves (*q. v.*); the promotion of the welfare of the Filipino; the occupancy of Cuba (*q. v.*) and the reëstablishment of its republic, the righting of abuses in the management of railroads and other great corporations; the completion of the Pacific cable; the creation of the Department of Commerce and Labor; the signing of a treaty of arbitration with Germany; financial control of Santo Domingo; the foundation of an American institute for the promotion of industrial peace between capital and labor; and the Pan-American Congress. In November, 1908, the United States entered into an agreement for the maintenance of national integrity and an open door in China. (See ROOSEVELT, THEODORE; PANAMA CANAL; RUSSO-JAPANESE WAR.)

In 1908 the Republican candidate for President, William Howard Taft, defeated his Democratic opponent, William Jennings Bryan, by a popular majority of less than 500,000. There was a wide cleavage between the progressive and conservative elements of the Republican party. Although the Payne-Aldrich Tariff bill did not especially suit President Taft, he signed it and defended it. Because of popular disapproval of this and other measures, the Democrats won control of the House of Representatives in the election of 1910. The Progressive wing of the Republican party steadily increased in strength and in 1912 refused to countenance the renomination of Mr. Taft. This resulted in the formation of the Progressive or "Bull Moose" party which nominated former President Theodore Roosevelt. Woodrow Wilson was the Democratic candidate and in the election he received a great majority of the electoral vote, but a minority of the popular vote. The balance of the popular vote was divided between Roosevelt and Taft, the former receiving some 500,000 more votes than the latter. (See TAFT, W. H.)

During Wilson's first term much important and far-reaching legislation was enacted. The Federal Reserve System was established; a new rural credit system was put into effect; and the Underwood-Simmons Tariff was enacted. Other important events were the ratification of the 16th Amendment, permitting the enactment of a Federal Income Tax; the 17th Amendment providing for the popular election of U. S. Senators; the enactment of the Clayton Anti-Trust Law; and the establishment of the Federal Trade Commission. After the outbreak of the World War in 1914, President Wilson attempted to maintain neutrality and did all possible to keep the United States out of the contest. In 1916 the Republicans nominated Charles Evans Hughes for President. Roosevelt declined the Progressive nomination and threw his support to Hughes. Wilson was re-elected by an electoral vote of 274 to 254 for Hughes. His popular plurality exceeded 450,000 votes.

In the face of continued violation of international law by Germany in her unrestricted submarine warfare, etc., it became impossible for the United States to remain neutral. President Wilson appeared before Congress and urged that war be declared.

This was done on April 6, 1917. (See WORLD WAR.)

After the close of the World War, President Wilson attended the peace conference in person. He was largely instrumental in the establishment of the League of Nations, but the high idealism of the war had died down and Republican opposition led to the refusal of ratification of the Treaty of Versailles by the United States Senate. Wilson campaigned ardently for the Treaty and the League, but the strain was too much for his health and he suffered a paralytic stroke. (See WILSON, WOODROW.)

In 1920 Warren G. Harding was the Republican candidate for President. The Democratic candidate was James M. Cox, Governor of Ohio, and it is interesting to note that his running mate was Franklin D. Roosevelt. Harding was elected. In 1921-22 the Conference on Limitation of Armaments was held in Washington. The Harding administration was notorious for the Teapot Dome and Veterans' Bureau scandals. Harding died suddenly on August 2, 1923, while returning from a visit to Alaska. Vice President Calvin Coolidge succeeded to the Presidency. The unceasing efforts of Senator Thomas J. Walsh of Montana unearthed the scandals of the Harding administration, and some of the perpetrators were prosecuted during the Coolidge administration. (See HARDING, WARREN G.)

Coolidge was nominated by the Republican party and elected President in 1924. He was opposed by John W. Davis, Democrat, and Robert M. LaFollette, Independent Progressive. Coolidge received a majority of the popular vote. He was an ardent champion of economy in government expenditures. His term was marked by great industrial prosperity, but the condition of the farmers was far from satisfactory. His veto of the McNary-Haugen bill for agricultural relief on two occasions caused considerable ill-feeling in rural communities. While vacationing in the Black Hills in 1928, Coolidge announced that he did "not choose to run" for President again. (See COOLIDGE, CALVIN.)

The campaign for the Presidency in 1928 was between Herbert Hoover, Republican, who had been Secretary of Commerce for eight years, and Alfred E. Smith, Democrat, who had been elected Governor of New York three times. Hoover won the election by an electoral vote of 444 to eighty-seven, and by a popular plurality of 6,423,612. For several months after the inauguration of Hoover, the nation continued to enjoy industrial prosperity. In October, 1929, however, occurred the great stock market crash which was the beginning of the prolonged business depression. Efforts on the part of the Hoover Administration to remedy conditions seemed to be ineffectual. Hoover signed the Hawley-Smoot Tariff, much the same as Taft signed the Payne-Aldrich Tariff. Dissatisfaction with it and other acts of the Administration enabled the Democrats to gain control of the House of Representatives as a result of the 1930 elections. In 1931 Chief Justice Taft resigned from the Supreme Court and died a short time later. Hoover appointed Charles Evans Hughes to succeed Taft as Chief Justice. (See HOOVER, HERBERT C.; HUGHES, CHARLES E.)

In 1932 the Democratic party nominated Franklin D. Roosevelt, Governor of New York, as its candidate for President. The Republicans renominated President Hoover. In the election, Roosevelt received the largest popular vote ever given a President, 22,813,786. Some 15,759,266 votes were cast for Hoover. Roosevelt received 472 electoral votes and Hoover received fifty-nine.

In the period between the election and inauguration, the economic condition of the country went from bad to worse. In the latter part of February a bank holiday was declared in the State of Michigan. This was the beginning of a bank depositors' panic, which became epidemic. The situation was beyond the bounds of ordinary treatment. On the day that Herbert Hoover stepped out of the Presidency, restrictions of some kind had been placed on the banks in every state in the Union. The country was in a fever of economic uncertainty. President Roosevelt in his inaugural address left no doubt that he intended to use heroic measures to cope with the emergency. Before nightfall there was action. The President resorted to a law enacted during the World War and never repealed, under which he closed the banks of the entire nation. Almost overnight the country rallied back of the new Chief Executive. Nine days after his inauguration sound banks were again open for business. In the meantime Congress had been called in special session. The outpouring of popular approval for his positive leadership made it inevitable that Roosevelt was almost certain to get whatever he asked for from Congress. In the ensuing one hundred days, the President asked for a good deal. On the average of every three days of the session, a new measure was introduced accompanied by a brief message from the President asking for its passage and explaining why the law was desirable. The Administration's program for overcoming the economic depression was embodied in fourteen major legislative enactments. Designated under their legal titles and also under popular titles attached to them, and appearing in the order of their enactment into law, these Acts are as follows:

Emergency Banking Law of 1933 (Bank Conservation Act).

Maintenance of Federal Credit (Reduction of Pensions and of Federal Employes' Salaries).

Revenue from Non-Intoxicating Liquor Act (Beer Bill).

Unemployment Relief through Public Works (Reforestation and Work Bill).

Agriculture Adjustment and Coinage of Money (Price Fixing and Inflation Act).

Tennessee Valley Authority Act of 1933 (Muscle Shoals Bill).

Securities Act of 1933 (Regulation of the Sale of Securities).

Joint Resolution for Abolishment of the Gold Payment Clause (Abandonment of the Gold Standard).

United States Employment Service (Wagner National Employment Service Law).

Home Owners' Loan Act (Direct Loans to Home Owners).

Farm Credit Act of 1933 (Loans to Agriculture).

Banking Act of 1933 (Glass-Steagall Banking Bill).

National Industrial Recovery Act (Trade Control; NIRA).

Emergency Railroad Transportation Act of 1933 (Railroad Coördination).

During the special session of the Seventy-third Congress, March 9 to June 16, 1933, there were enacted 105 laws, about evenly divided between the two Houses in origin.

Under the authority provided him by the Congress, President Roosevelt proceeded to set up a long list of agencies for economic recovery. It became the practice to refer to them by initials as follows:

AAA—Agricultural Adjustment Administration.
ACC—Agricultural Credit Corporation.
CCC—Civilian Conservation Corps, a body of 300,000 men engaged in reforestation, soil erosion, and flood control projects.
CCC—Commodity Credit Corporation.
CSB—Central Statistical Board.
CWA—Civil Works Administration.
DLB—Deposit Liquidation Board.
DMC—Dairy Marketing Corporation.
FACA—Federal Alcohol Control Administration has power to control production and distribution in the liquor industry by a quota system.
FCA—Farm Credit Administration.
FCT—Federal Coördinator of Transportation.
FDIC—Federal Deposit Insurance Corporation.
FEHC—Federal Emergency Housing Corporation.
FERA—Federal Emergency Relief Administration.
FHLB—Federal Home Loan Bank.
FSHC—Federal Subsistence Homestead Corporation.
FTC—Federal Trade Commission.
HOLC—Home Owners' Loan Corporation.
NEC—National Emergency Council.
NIRA—National Industrial Recovery Act.
NLB—National Labor Board seeks to maintain industrial peace.
NRA—National Recovery Administration, which aims at promoting the self-regulation of industry, through codes.
PAB—Petroleum Advisory Board.
PEC—President's Emergency Council.
PWA—Public Works Administration.
RFC—Reconstruction Finance Corporation loans money to industry, agriculture, banks and commerce.
SAB—Science Advisory Board.
SRC—Surplus Relief Corporation.
TVA—Tennessee Valley Authority under which it is planned to develop the Tennessee Basin by utilizing power at Muscle Shoals and the new Norris Dam.

Thus the "New Deal" began to be realized. Business became better; electrical power output increased; car loadings were greater. In the meantime, state conventions convened and ratified the 21st Amendment to the Constitution which repealed prohibition. In those states permitting it, liquor was legally sold on and after the afternoon of December 5, 1933. During the summer the World Economic Conference was held in London. The United States delegation was headed by Secretary of State Cordell Hull. For once the representatives of this country thought first of their homeland, and as the United States was the only country with any favors to grant and as it would not do so without reciprocal treatment, the Conference was not a great success. At the Pan-American Congress at Montevideo, however, Secretary Hull achieved a real triumph, resulting in increased good will between the United States and the Latin American countries.

New names and faces appeared in the government at Washington. One of the most outstanding was General Hugh S. Johnson, head of the NRA. His dynamic personality led to his being greatly publicized. In addition to his work as Secretary of the Interior, Harold Ickes also became head of the Public Works Administration. Owing to ill health, Secretary of the Treasury Woodin took a leave of absence and later resigned. He was succeeded by Henry Morgenthau, Jr.

An outstanding event of the year was the resumption of regular diplomatic relations with Russia (the Union of Socialist Soviet Republics). This was accomplished after a series of conferences at the White House between President Roosevelt and Maxim Litvinov, Soviet Foreign Commissar.

The Seventy-third Congress

On that memorable inauguration day, March 4, 1933, the nation welcomed Franklin Delano Roosevelt as the new President of the United States and the author of the New Deal by which it was hoped disaster would be averted and the confidence of the American public restored. The popularity of President Roosevelt has not diminished in the least since that date. The activities of regular session of the Seventy-Third Congress, which opened in January, 1934, have been a clear indication of the growing favor and high esteem with which our President is regarded. However much Congress or individuals may oppose the policies endorsed by the New Deal, and it cannot be denied that protests have been uttered, at times quite vehemently, against the prevailing policies of government, it is a well known truth that the country is behind its Chief Executive one hundred per cent. One of the greatest achievements of the New Deal has been to make the average American voter increasingly conscious of governmental affairs in the nation's capitol. For many years the American voter has manifested a feeble and disinterested consciousness of his government's policies.

President Roosevelt personally addressed the opening session of Congress. His address, which was enthusiastically received by the Democrats and progressive Republicans in Washington, was broadcast by radio to the entire nation. On the following day the President presented his budget message to Congress wherein he frankly stated the enormous cost of his recovery program. The fiscal year closed on June 30. Before that date President Roosevelt disclosed the fact that the Government will expend $10,569,006,967. The Government income to that date will amount to only $3,259,938,756. A deficit will therefore result of $7,309,068,211. These are the figures estimated by President Roosevelt in his budget message. He declared that the huge deficit will be justified by "the immeasurable benefits" which will be derived from the accomplishment of the recovery program. He said in part, "we can confidently look forward to cumulative beneficial forces represented by increased volume of business, more general profit, greater employment, a diminution of relief expenditures, large governmental receipts and repayments and greater human happiness." The Federal Government expects to borrow $10,000,000,000 within the next six months. Emergency expenditures were placed under the control of the Budget Bureau which is under the direction of Lewis Douglas.

On March 29, the excess of expenditures over revenue in the Federal Government totalled $2,511,658,238. Officials of the United States Treasury conceded that at the close of the fiscal year government expending would fall below the amount estimated by President Roosevelt in his budget message. The deficit would also be less than the estimate given in January. The borrowing program has been sharply curtailed. President Roosevelt in his budget message to Congress said the public work outlays would reach $1,667,190,800. On March 29, the outlay totalled $379,993,835.

AAA. The Agricultural Adjustment Administration has attempted during the past year, 1934, to promote the prosperity of the farmer, not however, without being subjected to Congressional criticism. The Administrator of the AAA, Chester C. Davis, reported in the latter part of March that partial economic recovery has been effected in the field of agriculture since the AAA began operating. Production-adjustment programs have been promulgated for cotton, tobacco, hogs, and wheat. When the program has been fully carried out, 40,000,000,000 acres of land will have been withdrawn from production according to Mr. Davis. The crop reduction plan of the AAA is but temporary. "The AAA has no thought of preparing for a permanent scarcity. The American population is still increasing, though at a declining rate. Agriculture's goal is the economical production of ample raw materials to supply the nation's needs and to meet the demand for such products as can be sold abroad at remunerative prices while at the same time avoiding surpluses that destroy the buying power of farm commodities and wreck the farmer's standard of living."

As the program outlined by the AAA approaches fuller realization, one contract, which will be formulated to include all commodities, will replace the individual contracts for each commodity which are now prevalent and which are drafted by country control associations. The activities of the AAA have a wide range. In January Secretary Wallace asserted that in 1934 the income of the farmers would increase $2,000,000,000.

The Bankhead bill, which places compulsory crop control on one crop, cotton, was introduced in Congress in February. It was passed by the House in the early part of March and imposed in the Senate on March 27. Under the scheme set forth in the bill the 1934-35 cotton crop would be limited to 10,000,000 bales. All cotton produced over that amount would be subject to a tax at fifty per cent of the central market price. Should the bill be enacted it is generally believed that compulsory control will be widely extended.

Farm mortgage loans made by the Federal Land Banks and the Lank Bank Commissioner are issued in bonds of the Federal Farm Mortgage Corporation rather than in cash. The corporation was organized in the spring of 1933 to provide for the continuance of farm debt refinancing activities. It may issue $2,000,000,000 of its bonds for that purpose, the interest and principal payments on the bonds being guaranteed by the United States.

One of the most complex problems demanding the consideration of the AAA has been that of milk. Farmers have been chiefly interested in securing higher prices for milk. Milk strikes were frequent. On January 31, Secretary Wallace announced the new AAA policy with regard to milk. A fixed price was established for the producer while the price to the consumer is to be decided by competition. In the future all milk distributors must be licensed by the AAA. Market agreements are being drafted.

In addition to the many products already demanding AAA regulation, President Roosevelt, on February 8, urged the extension of AAA activities to include sugar so that the sugar industry might be restored as a profitable undertaking both in the United States and in Cuba.

CWA. The Civil Works Administration was created on November 29, 1933, to provide immediate work for 4,000,000 unemployed men and women who had previously been maintained by public relief. At that date it was evident that the PWA projects could not be developed quickly enough to meet the tremendous unemployment problem which was confronting the nation. The CWA was supported by borrowed money. $400,000,000 of PWA funds were used to employ men at fifteen dollars per week in jobs which were hastily created. This appropriation soon dwindled and it was necessary to appropriate $450,000,000 more so that the CWA might carry on. The enormous expenditures which the continuance of the CWA entailed were destructive to government credit. It was deemed advisable, therefore to submit the CWA to a process of liquidation. On February 14, Congress, in accordance with President Roosevelt's request, voted $950,000,000 for the continuance of CWA activities until May 1. On that date its activities were absorbed by the PWA. The Administrator of the CWA, Harry L. Hopkins, announced in February that $500,000,000 of this amount would be used for direct relief. The remainder would be devoted to the closing of CWA operations.

The seriousness of the unemployment problem, however, created an urgent demand for an immediate relief program. On February 28, President Roosevelt announced such a program to replace the CWA. Under this system those who could receive relief were divided into three classes: (1) rural families in need of immediate relief; (2) the vast body of unemployed in large cities; (3) needy persons in single-industry communities where re-employment is considered impossible. This system of relief will be administered by local agencies and Federal funds.

RFC. The Reconstruction Finance Corporation originated during the Hoover Administration. It was continued in the Roosevelt Administration under the leadership of Jesse H. Jones of Houston, Texas. In March evidence of improved business conditions was noted by Chairman Jesse H. Jones. An average of $3,000,000 daily on outstanding loans was being repaid to the Reconstruction Finance Corporation. By the end of the fiscal year on June 30, Mr. Jones estimated that a total repayment of $725,000,000 to this agency would be received in view of the speedy liquidation of loans which is taking place. The RFC authorized the purchase of preferred stock in 6,331 banks to the sum of $1,043,117,350. On March 19, the actual cash advances for such a purchase had been made to 2,350 banks in the amount of $557,213,000. Up to March 15, the RFC had loaned $692,563,545 to 2,163 closed banks. The result of these loans was a release of substantial deposits and purchasing power. The largest amount loaned by the corporation to liquidate assets of closed banks has been $172,426,832, an amount loaned to 170 banks in the state of Michigan.

An omnibus bill is now under consideration in the Senate which seeks to supplement the bank credit plan. The bill contains two features over which there has been much controversy. The RFC asks for the authority to make direct loans to industry in exceptional cases when other lending agencies, including the proposed intermediate credit banks, fail to meet the demand and when loans can be properly secured. The bill would also revise the method of financing exports and imports, simplifying it to the extent of granting the RFC the right to own the common as well as the preferred stock in export-import banks. Such a method would make it unnecessary to draw on public works funds. The bill has been the subject of much debate.

Brain Trust. On March 26, the Bulwinkle resolution was introduced which proposes an investigation of the "Brain Trust." Under the terms of the resolution, a House Committee of five is empowered to conduct a thorough investigation of this group of advisers. Considerable criticism of this body has been current in Washington circles, an investigation of which will undoubtedly clear the situation considerably. The "Brain Trust" is by no means a fixed or permanent affair.

Supreme Court Decisions. On January 8, the Supreme Court of the United States handed down a decision which was the first of its kind on the constitutionality of the emergency legislation enacted by both individual states and the United States government. The decision rendered was on the Minnesota mortgage moratorium law. It was the first decision of the Supreme Court since the advent of the Roosevelt Administration and is regarded as one of the most important decisions ever handed down by the highest court of the land. The Court was divided five to four on the issue. The majority opinion was written by Chief Justice Hughes who held that an "emergency may furnish the occasion for the exercise of power." In considering the principle whether in emergency "public welfare" takes precedence over "individual rights," Chief Justice Hughes said, "Where in earlier days it was thought that only the concerns of individuals or classes were involved and that those of the State itself were touched only remotely, it has later been found that the fundamental interests of the State are directly affected, and that the question is no longer merely that of one party to a contract as against another, but of the use of reasonable means to safeguard the economic structure upon which the good of all depends." The minority opinion was written by Justice Sutherland. The importance of the decision rests in the disclosure that the United States Supreme Court approves the recovery program of President Roosevelt and will uphold the Federal recovery acts against the claims of opponents that the Constitution of the United States is being infringed upon.

The second decision of the Supreme Court on emergency legislation was rendered on March 5. The New York State Milk Law was declared constitutional. The specific issue of the case was price fixing. The majority opinion was written by Justice Roberts in which he declared, "the Fifth Amendment, in the field of Federal activity, and the Fourteenth, as respects State action, do not prohibit governmental regulation for the public welfare. The Constitution does not secure to anyone liberty to conduct his business in such a fashion as to inflict injury upon the public at large, or upon any substantial group of the people. Price control, like any form of regulation, is unconstitutional only if arbitrary, discriminatory, or demonstrably irrelevant to the policy the Legislature is free to adopt, and hence an unnecessary and unwarranted interference with individual liberty."

On March 17, a decision of the Supreme Court ruled that trust companies cannot protect themselves against or elude responsibility for losses incurred through its handling of property of a client by means of a clause in an agreement relieving the company of liability. The decision was handed down by Justice Bernard L. Shientag. The case involved the Irving Trust Company which was ordered to account for its management of a fund entrusted to the company by Mrs. Blanche R. Jothann. The court decision removed the clause reading "the trustee shall not be liable for any acts or things done, suffered or omitted in the exercise of good faith and without willful neglect or default," from the agreement concluded between the company and its client.

Monetary Policy. On January 20, the Gold Reserve Act of 1934 was passed in the House of Representatives by a vote of 360 to 40. The Senate adopted the bill on January 27, after it had been subjected to much debate, by a vote of 66 to 23. President Roosevelt approved the bill on January 30. There followed on January 31, the President's proclamation which reduced the gold content of the dollar from 25.8 grains to 15 5-21 grains, nine-tenths fine. The gold value of the dollar became approximately 59.06 per cent of its former value as established in 1900. The price of gold was set at thirty-five dollars an ounce. The title to all gold held by the Federal Reserve Banks, amounting to $3,500,000,000, passed from the control of the Federal Reserve Banks to the United States Government in exchange for gold certificates. The United States thus entered upon an international gold bullion standard.

The speed with which the bill was acted upon and enforced is but indicative of the wide support being accorded the President in his New Deal policies. The Gold Reserve Act has been acclaimed one of the most important pieces of financial legislation in the history of the United States. The coinage of gold has ceased, but gold bullion held in the Treasury "was established as backing for paper currency." The new monetary policy will be carried out under the supervision of the Secretary of Treasury. The Treasury will buy all gold offered, with the exception of hoarded gold, at thirty-five dollars per ounce. Henceforth gold will be used only in the settling of international exchange balances. In such cases the gold will be shipped in bullion form rather than coin. This is the international gold bullion standard.

Navy. On March 27, President Roosevelt affixed his signature to the Vinson Bill which calls for a full treaty-strength navy. The President emphasized the fact that the bill merely states a naval policy and makes no appropriation for actual construction. "This is not a law for the construction of a single additional United States warship. The general purpose of the bill is solely a statement by the Congress that it approves the building of our navy up to and not beyond the strength in various types of ships authorized, first by the Washington naval limitation treaty of 1922, and secondly, by the London naval limitation treaty of 1930." At the naval conference to be held in 1935, President Roosevelt is expected to seek further reduction in naval armaments.

Under the terms of the bill, a five-year building program is outlined, the cost of which will total approximately $60,000,000 annually, for the purpose of bringing the navy up to treaty strength. The bill also provides for the construction of 1,184 naval aircraft. After the signing of the bill by the President, the Navy Department immediately made preparations to appeal to the budget bureau for permission to ask Congress for an appropriation of thirty-four million dollars with which to begin shipbuilding. Plans were discussed for the construction of fourteen destroyers and six submarines.

The signing of the Vinson Bill brings to a close the legislation which it was necessary for the Administration to enact if its program for building the navy up to treaty limits was to be followed up to completion. The proposal for navy construction was first announced in July, 1933, by Secretary of the Navy, Claude A. Swanson. An additional sum of $238,000,000 from the funds of the PWA supplemented the naval appropriation of Congress. During March there were many vessels being constructed under the regular appropriations. These included one aircraft carrier, 13,800 tons; 6-inch gun cruisers, 60,000 tons; one 6-inch gun cruiser, 10,000 tons; twelve destroyers, 19,400 tons and two submarines, 2,260 tons.

Vessels under construction with PWA funds included two aircraft carriers, 40,000 tons; one 8-inch gun cruiser, 10,000 tons; three 6-inch gun cruisers, 30,000 tons; and four submarines, 5,200 tons.

HOLC. The bonds of the Home Owners Loan Corporation were originally guaranteed by the Federal Government only as to interest. On March 1, President Roosevelt requested the National Congress to guarantee the principal of the $2,000,000,000 bonds of this corporation. "The purpose of such legislation," according to the President, "as in the case of farm financing, will be to assure combined progress on a self-sustaining basis of the making of loans for the purpose of refinancing home mortgages without interruption. There is the same reason for acknowledging publicly what already amounts to a moral obligation in respect to these bonds as there was in the case of bonds authorized to be issued through the Farm Credit Administration."

Credit Banks. On March 19, President Roosevelt recommended that twelve credit banks be created to supply additional capital for the development of industry. The President presented his proposal for the creation of such banks by letter to the Chairman of the Senate and the House banking committees. Legislation was immediately introduced to carry out the President's proposal. The request for credit banks was made primarily in the interest of smaller industries. The credit assistance thus far received by these industries cannot be compared to that offered larger industries. President Roosevelt estimated that a working capital of $700,000,000 would enable such a plan to be carried out effectively. Such a plan would furnish employment to about 380,000 men and women and would enable about 350,000 employés to continue working.

Philippine Independence Act. On January 17, 1934, the Hawes-Cutting act lapsed. It had been enacted on January 17, 1933, but had never been accepted by the Philippine legislature. The chief objection to the act was the insertion of a clause which provided for occupation of the islands by the United States army and navy, if the American Government so desired, after independence had been accomplished. When Congress convened in January, 1934, therefore, President Roosevelt requested its consideration of the demands of the Filipinos for independence. The act which was passed is but a revised edition of the Hawes-Cutting Act. It is known as the McDuffie-Tydings Bill and was signed by President Roosevelt on March 24. The American public was little moved by the independence bill.

Under the terms of the Act, Philippine independence will be granted in twelve years. Up until that time, however, there must be maintained an autonomous government and a constitution must be formulated and adopted. The United States agrees to relinquish all military bases in the Philippines as soon as complete independence is accomplished. Señor Manuel Quezón, insular Senate president and head of the Philippine mission in the United States, accepted the act as the "best solution possible" of a question which has long been in dispute. His return is anxiously awaited in the Philippines by the legislative body. A special session of the legislature will be held at that time to formally accept the law. According to the Manila *Bulletin,* an American-owned newspaper, "the bill actually pleases nobody and is technically acceptable to the various political camps only because, as a compromise, it is something which cannot be dodged." The Filipinos were little stirred by the news of the new independence Act. The independence struggle is of long standing and the natives could arouse but little fervor over the prospect of independence in 1946.

FOREIGN AFFAIRS

Ominous clouds of sinister portent have been passing over Europe within the past year, clouds which have been spreading with astounding rapidity. The European nations threatened with the prospect of war, have been seeking to draw the United States into a security pact. Advocates of a World Court, appearing before the Senate Foreign Relations Committee on March 23, demanded "a reaffirmation of faith in judicial processes as a substitute for war." In 1926 the Senate voted a tentative approval of a World Court by a vote of 76-17 with five reservations. Since that date these reservations have been met by a majority of World Court members and immediate action upon the issue by the Senate is now being urged. Adherence to the World Court has been endorsed by hundreds of prominent Americans. It has been supported by President Roosevelt and by his predecessors, Calvin Coolidge and Herbert Hoover. Sixteen State legislatures backed the issue as did the American Bar Association, the United States Chamber of Congress, the General Federation of Women's Clubs, the National Grange, and the National Education Association. Among the distinguished public figures who have endorsed American adherence to the World Court are Newton D. Baker, Alfred E. Smith, and Elihu Root. Mr. Henry I. Harriman, president of the United States Chamber of Congress, emphatically declared before the Senate Foreign Relations Committee that "in behalf of increased commerce and comity between nations and in behalf of international peace, ratification should take place immediately."

On May 22, 1933, Norman Davis made an offer at Geneva in the name of President Roosevelt, whereby "the United States pledged itself to consult with other nations in case of a threat to peace, and in case it agreed with a majority decision as to which was the aggressor State, to relinquish all neutral rights that might compromise collective sanctions against the State." The offer was conditioned upon European disarmament. In March, 1934, European nations are anxious to know whether the United States still adheres to this pledge. Should such be the case, European powers, especially Great Britain and France are desirous of having the United States become a member of a security pact now in the process of organization in Europe. To-day, however, the question is not disarmament, but rather rearmament. It is this point which makes for uncertainty in the success of a security pact. The United States has thus far avoided membership in any security pact in return for disarmament, and Europe now awaits America's decision as to whether she will agree to enter into a security pact with rearmament. "Failure of this pact would lead to an armaments race and inevitably to war, and France hopes that this threat will influence the American decision."

The Far Eastern question has long been a perplexing problem to the United States. On January 18, Dr. Hornbeck, Chief of the Division of Far Eastern Affairs in the State Department, attacked Japan's policy of imperialism in China. He declared that the non-aggression Nine Power Treaty of 1922 contains, "a solemnly concluded mutilateral pledge on the part of the United States and (now) thirteen other powers to respect China's integrity, to foster the principle of equality of commercial opportunity in China and to practice self-denial and self-restraint in relations with China." The obligations of that treaty have been renewed in the several protests which have been issued against the Japanese policy with the request that Japan respect those obligations. The United States does not stand alone in this request. Great Britain and other European powers have issued similar notes to the Japanese government. On March 21 a formal note was dispatched by the Japanese Foreign Minister Koki Hirota to Washington by which Japan hopes to conciliate the United States. During the Hoover Administration a policy of non-recognition was adopted by the United States towards Japanese occupation in Manchuria and the buffer state of Manchukuo. It is this policy which Japan is attempting to persuade the United States to abandon. Japan also seeks naval parity with the United States and Great Britain. The naval question is perhaps the most vital of all Japanese demands. The Japanese note of March 21, was replied to by Secretary of State Cordell Hull. The United States was not committed in any way by Cordell Hull's reply. President Roosevelt has, since assuming office, avoided making any public statement on the question and antagonizing Japan, although prior to his election he endorsed in principle the doctrine set forth by Mr. Stinson of non-recognition of seizure of territory by force in contravention of existing treaties. Japan is intent upon establishing peaceful relations with the United States. Towards this end Prince Iyesato Tokugawa visited the United States in February on a "good-will mission."

United States, Departments of. There are ten departments of the executive branch of the government of the United States, of which the President is the head. The heads of the departments, known as secretaries, are appointed by the President, subject to confirmation by the Senate. The Continental Congress had established a post-office department before July 4, 1776, and afterwards established departments of foreign affairs, of the treasury and of war. The secretaries have a salary of $12,000 a year each. They hold no seats in Congress, but form the President's cabinet or board of advisers. The heads of the departments are the Secretary of State, Secretary of the Treasury, Secretary of War, Secretary of the Navy, Secretary of the Interior, Secretary of Agriculture, Secretary of Commerce, Secretary of Labor, Postmaster-General and Attorney-General.

Department of State. The department of state, first called the department of foreign affairs, has charge of all the relations and business of the United States with foreign nations. The divisions or bureaus as they are called are the diplomatic bureau, consular bureau, bureaus of statistics, accounts, archives, library, trade, appointments and passports. There are four classes of ministers sent to foreign countries to represent the United States: ambassadors extraordinary, ministers plenipotentiary, ministers resident and *chargés d'affaires* (persons in charge of affairs). In the principal foreign cities are stationed consuls or governmental agents, who look after the interests of Americans, residents or travelers, and especially American seamen. The principal officers of the department of state, besides the secretary, are three assistant-secretaries, eight heads of bureaus, one solicitor, two assistant-solicitors and one chief clerk.

Treasury Department. The largest and most important department is that of the treasury, which was formed in 1789. The duties of the secretary of the treasury are to superintend the collection of revenue, to grant warrants for money used in carrying out the appropriations of Congress, to oversee the public debt, national banks, coinage, internal revenue, etc. There are three assistant-secretaries; eight division-chiefs; two comptrollers; a chief clerk; and six auditors. There also are a treasurer of the United States, who has charge of all public money and pays it out only on orders from the secretary of the treasury; an assistant-treasurer; a register of the treasury, who keeps the accounts; a deputy-register; a commissioner of internal revenue; a director of the mint, assisted by two deputies; a chief of the bureau of engraving; an actuary and a surgeon-general; the supervising architect; two solicitors; and a chief of secret service. The director of the mint holds office for five years, and has charge of the mints and assay-offices. The chief of the bureau of engraving and printing has the oversight of the printing and engraving of all United States bonds, bank-notes etc. and the printing of all public documents, reports etc. The internal-revenue bureau has charge of the collecting of government taxes; the life-saving service has charge of the appliances for the saving of life and property on all our coasts; and the architect has charge of all building, repairs, and construction. The bureaus of statistics and navigation, the coast-survey, and steamboat-inspection formerly belonging to the treasury department, were transferred to the department of commerce and labor when that department was established in 1903. Full reports are required of all the officers of the treasury. A negative qualification for this office is that the Secretary of the Treasury shall not be interested in foreign commerce.

The Department of War. The President is commander-in-chief of the army, but never acts in that capacity, and makes all communications to it through the secretary of war. The army is directly under the control of the secretary of war, with the aid of an assistant secretary and the chief-of-staff of the army. The war department, through its secretary, reports on the state of the army, and the necessary expenses. He also has charge of the improvements of rivers and harbors. The military secretary has charge of the recruiting and mustering of soldiers and records of the army; the inspector-general examines arms and the drill and discipline of the army; the judge-advocate-general maintains supervision over the affairs of the bureau of military justice;

and the signal-officer, in charge of the signal-service, which oversees the seacoast service; the quartermaster-general, with the duty of providing the army with supplies; the commissary-general, who sees to the rations or food of the army; the paymaster, who keeps accounts; and the surgeon-general are important officers of the department. There also are an ordnance department and an engineer corps, the chief of ordnance and the chief of engineers being very prominent and important officers. This department also has a bureau of insular affairs, a custodian of public buildings and a landscape-gardener, while every division or bureau named also has a head-clerk. (See Quartermaster and Signal-Service.)

Department of the Navy. The navy has one admiral and 155 rear-admirals, 20 of whom are in service. The grade of commodore on the active list has been abolished from the navy. The navy department was not formed until 1798, and has eight bureaus of yards and docks, navigation, ordnance, construction and repairs, equipment and recruiting, provisions and clothing, steam engineering, medicine and surgery. The duties of the heads of these departments, three of whom rank as rear-admirals while in office, are similar to those of the war department, and are sufficiently indicated by the name of the bureau. (See Naval Academy, Naval Observatory, Navy and Observatory.)

The Postoffice Department. The postoffice department, permanently established in 1794, has, besides the postmaster-general, four assistant-postmasters, each with a corps of superintendents and assistants. The first assistant-postmaster has charge of the money-order system and the dead-letter office (*q. v.*), where all unclaimed mail is sent, the free delivery system and the location of new offices. The second assistant arranges the mail service, making contracts, furnishing bags, locks etc. The third assistant has charge of the making and distributing of stamps, postal cards, wrappers, the collection of revenue from postoffices and other financial operations. The fourth assistant has charge of post-office inspectors, receives applications for postmasters, issues their commissions, and investigates losses by mail. See Post-Office.

The Department of the Interior. The department of the interior was formed in 1849, and has charge of public lands, Indians, pensions, patents, education, the census and geological survey. There are two assistant secretaries; a commissioner of public lands; a commissioner of pensions, with the oversight of 18 pension agencies; the commissioner of Indian affairs, with a board of ten commissioners and 70 agents; the commissioner of patents, of education and of the geological survey and the reclamation service. (See Census, Education, Geological Survey, Indians, Patents, Pensions, Smithsonian Institute, Surveying and Trade-Mark.)

Department of Agriculture. The agricultural department, formed in 1889, has charge of experimental stations where new plants are tested, of the distribution of rare seeds and plants, the collection of statistics, the study of animal diseases and insect pests weather observations etc. (See Forest-Service, National Parks and Signal-Service.)

The Department of Commerce has charge of the interests of commerce, trade and manufactures; also of the census, of statistics, of steamboat service and navigation. The Federal Trade Commission (established 1914) the Light-house Board, the Fish Commission, the Coast and Geodetic Survey, the Bureau of Standards and the reports of consular officials and of customs and revenue officials belong to this department. See Coast-Survey, Fish-Culture and Navigation Laws.

The Department of Labor. The purpose of this department is to promote the welfare of wage earners, to improve their working conditions and advance their opportunities for employment. Among other things, it deals with naturalization and immigration and through its Children's Bureau with the welfare of children. See Immigration Bureau.

The Department of Justice. The attorney-general presides over this department and conducts suits for the United States. This department is distinct from the supreme court.

United States Names and Meanings.

Name	Origin and Meaning	Popular Name
Alabama	Indian name of a river meaning Here We Rest	Cotton State.
Arkansas	Indian name of a tribe meaning They Who Went down the River	Bear State.
California	Spanish for Hot Furnace	Golden State.
Colorado	Spanish for colored or red.	Centennial State.
Connecticut	Indian name meaning The Long River	Nutmeg State.
Delaware	English name of a nobleman	Diamond State (or Little Blue Hen).
Florida	Spanish word meaning Flowery	Everglade State.
Georgia	Latin form meaning Land of (King) George	Empire State of the South or Goober State.
Idaho	Indian name meaning Mountain-Gem.	Gem of the Mountains.
Illinois	Indian name of a tribe, meaning The Men.	Prairie State
Indiana	Latin form, meaning Land of Indians.	Hoosier State.
Iowa	Indian name of a tribe and a river	Hawkeye State. (There was an Indian chief named Hawkeye).

NAME	ORIGIN AND MEANING	POPULAR NAME
Kansas	Indian; from *kanza*, meaning Swift and Wind. It also is said to mean Smoky Water	Sunflower State.
Kentucky	Indian word meaning The Barrens and Prairie	Bluegrass State.
Louisiana	Latin form meaning Land of (King) Louis	Creole, Pelican or Canebrake State.
Maine	French name of a province; or English "main," to distinguish the mainland from the islands	Pinetree State.
Maryland	English name for the queen of Charles I of England	Old-Line State.
Massachusetts	Indian name meaning Place of Great Hills	Bay State.
Michigan	Indian name meaning the Great Lake	Peninsular or Wolverine State.
Minnesota	Indian name meaning Sky-colored Water	Bread and Butter, or Gopher, or North Star State.
Mississippi	Indian name meaning Father of Waters or Great River	Bayou State.
Missouri	Indian name meaning The Big Muddy	Bullion State.
Montana	Spanish for mountain	Mountain or Treasure State.
Nebraska	Indian name meaning Shallow Water or Water Valley	Tree-Planter State.
Nevada	Spanish for snow-covered	Sage-Brush or Sage-Hen State
New Hampshire	English name for a county in England	Granite State.
New Jersey	English name of an island in the English Channel	Garden State.
New York	English name of a city in England and of a duchy	Empire State.
North Carolina	Latin form meaning Country of (King) Charles	Old North, or Tarheel, or Turpentine State.
North Dakota	Indian name of tribes meaning Allies	Flickertail State.
Ohio	Indian name meaning The Beautiful River	Buckeye State.
Oklahoma	Indian name meaning Land of the Fair God	
Oregon		Beaver or Sunset State.
Pennsylvania	Latin form meaning Penn's Woodland	Keystone State.
Rhode Island	Dutch name meaning Red Island	Little Rhody.
South Carolina	See North Carolina	Palmetto State.
South Dakota	See North Dakota	Coyote or Sunshine State.
Tennessee	Indian name meaning The River of the Big Bend	Big Bend or Volunteer State.
Texas	Indian name of tribes meaning Confederates	Lone Star State.
Utah	Indian name of a tribe	Salt Lake State.
Vermont	French name meaning Green Mountains	Green Mountain State.
Virginia	Latin form meaning Virgin's Land, for Queen Elizabeth	Old Dominion State.
Washington	English and American name of a family	Corner or Evergreen State.
West Virginia	See Virginia	Panhandle State.
Wisconsin	Indian name meaning The Wild, Rushing River	Badger State.
Wyoming	Indian name meaning Great Plains	Equality State.

Alaska is an Inuit word meaning The Great Land; Arizona an Indian name that signifies The Place of Small Springs; Hawaii a Polynesian title; Mexico, as in New Mexico, is from the Aztec name of *Mexitl*, the Mexican war-god; Panama is an Indian or Spanish name; Philippines is a Latinized Spanish form meaning Land of (King) Philip (of Spain), Filipino meaning an inhabitant of the Philippines; and Porto Rico is a Spanish term meaning Rich Port.

United States Steel Cor′pora′tion. This corporation is the world's greatest combination of capital. It was organized under the laws of New Jersey in March, 1901, being formed from ten large corporations, each of which was itself a consolidation of several smaller companies. Its total capitalization is $1,404,000,000, or nearly half of all the money in the United States; it represents one sixty-seventh of the total wealth of the United States in 1900. The corporation, when founded, exercised direct and positive control over 213 manufacturing and transporting plants and companies and over 41 mines in 18 states. One hundred of the manufacturing plants were in Pennsylvania, 51 in Ohio, 15 in Illinois, 12 in Indiana, 12 in New York and the rest scattered from Connecticut to California. Its mines furnished more than half of the total production of iron-ore in the United States, four fifths of the bessemer steel and two thirds of the steel rails. It controlled 1,000 miles of railroads and a lake-fleet of 112 vessels, one third of the tonnage on the northern lakes. By "community of ownership" it controlled the anthracite fields of Pennsylvania, thousands of miles of railroads and an ocean steamship line. It has rapidly increased its holdings. The company controls steel interests in America. Our steel exports in 1900 were valued at $130,000,000. Manufacturers of other countries look upon this concentration of interests as a strengthening of American exporting capacity.

U′niver′sity, a higher educational institution, having the right to give degrees in several departments of learning and with a body of teachers or faculty in each of the different schools or colleges connected with it. The modern university, dating back to the 12th or 13th century, is thought to be the outgrowth of the schools connected with the convents and monasteries throughout Europe. When some popular teacher, as Abelard or Peter Lombard, drew crowds of students, these usually formed themselves into a corporation to which was given the name of *universitas*. Some of the early universities, as that of Paris, were formed by a body of teachers, while others, as Bologna, were corporations of students. The faculties of a university are the teachers in particular departments, as the faculty of law, faculty of arts etc. The two highest officers of a university have usually been the rector and chancellor. A degree is given by the university when a student has passed through a certain part of the course of study. The degree of doctor or master at first entitled the person who received it to teach in the university giving the degree. Pope Nicholas I near the end of the 13th century granted the University of Paris the right to endow its graduates with the power to teach anywhere. The degree of bachelor, borrowed from the terms used in knighthood and indicating an imperfect or partial graduate, that is, one who had finished only the lowest stage of university work, was first introduced at the University of Paris in the 13th century. The colleges, as the different schools connected with a university are called, at first were mere boarding-halls, which were later appropriated to the faculties of different departments.

Europe has about 100 universities, the oldest being the University of Paris, which was organized in the 12th century but was not called a university until the 13th century. It had two chancellors, and gave degrees, those of doctor and master at first being the same, but afterward the degree of master was given to those who were qualified to teach the arts and that of doctor to those who could teach theology, law or medicine. The Sorbonne (*q.v.*) was the theological school of this university, which was suppressed by the convention in 1793, but was revived by Napoleon I as the University of France, which has charge of all public instruction. The "Academy" of Paris has five faculties: law, medicine, theology, science and letters. It usually has 4,000 students. The University of Bologna, with its charter given by Frederick Barbarossa in 1158, was especially celebrated for its law-schools; and that of Salerno, of the 12th century, for its instruction in medicine. Women were admitted to both, and graduates of Salerno practiced as "lady physicians" in the 12th and 13th centuries. Italy has twenty-one universities; Germany twenty-one; England ten; Ireland two; Scotland four; and there are about thirty in all the other countries of Europe. The oldest universities in Germany are Heidelberg, Leipsic, Tübingen, Jena and Halle. The German universities are governed by the professors, presided over by a rector or chancellor. There are three grades of professors, called ordinary professors, extraordinary professors and *privats-docent*. The ordinary professors are the highest class, and are elected by the government from candidates chosen by the faculty, and give lectures on the subject which they are selected to teach. The extraordinary professors have smaller salaries, and can lecture on any subject they please, as may also the *privat-docent*. The student attends any lectures he chooses, but cannot practice any profession without a certain course of university study. Göttingen University, founded in 1734 by Baron Munchausen under the auspices of George II, king of England and elector of Hannover, was one of the most famous in Europe, having over 3,000 students until that at Berlin was founded in 1810. The University of Tübingen, dating back to 1478, with seven faculties, is noted as having once been the seat of what is called the Tübingen school of theology. The Universities of Berlin and Bonn are among the most prominent in Germany, that at Berlin having about 6,570 students and 471 professors. Heidelberg University has a professorship of English literature, established in 1873, the first of the kind in Germany. The German universities are under the control of the government, and most of them are dependent upon state appropriations. The universities of Switzerland, Holland, Belgium, Russia and Austria are on the German model. That of Prague, founded in 1348, is the oldest in central Europe. Louvain, founded in 1425, was once very famous, as was also the University of Leyden, founded by William of Orange. Spain has nine universities, and Portugal one. The University of Salamanca, established in 1415, had at one time 10,000 students and 28 colleges. The oldest Scandinavian university is at Upsala in Sweden, and there is one at Christiana in Norway, with another at Copenhagen in Denmark.

Of the four English universities, Oxford and Cambridge are the oldest, dating back to the 13th century. Those of Durham and London are modern, being founded in the 19th century. The University of London has no colleges directly connected with it, but confers degrees, upon examination, to students of nearly all the institutions of learning in the country. Oxford has twenty-three colleges and Cambridge eighteen. This college system distinguishes the universities of England from those of the continent. A student must connect himself with a college before he becomes a member of the university. The teaching in these colleges is done almost entirely by tutors, and the professors of the university only deliver lectures on special subjects once or twice a week. Degrees are dependent upon examinations, and fellowships are provided, by means of which promising students can continue their advanced studies for years. The Scottish universities are at Edinburgh, Glasgow, Aberdeen and St. Andrews, that of St. Andrews being the oldest. They were patterned more after the German universities than those of England. The students were divided into four nations, named from the parts of Scotland from which they came. The University of Edinburgh has but one college, but this has all the powers of a university. The University of Dublin has only one college, Trinity College, but several faculties, including those of oriental and modern languages, mining and civil engineering Queen's University has three colleges, at Belfast, Cork and Galway, each called Queen's College, and the governing body of the university holds its meetings at Dublin.

In the United States, the term university is loosely applied to many institutions which strictly are only colleges, just as the term college includes many academies and high schools. In its strictest sense it is limited to institutions having several schools, as those of law, theology arts etc., in addition to the regular college course, where graduate work is carried on, that is, work done in the higher branches after graduation in a college. Harvard University, the oldest and one of the best-equipped of our colleges, is at Cambridge near Boston. It includes Harvard College, the Divinity School, Law School, Lawrence Scientific School, the Graduate School, Medical School, Dental School, School of Business Administration, Schools of Architecture and Landscape Architecture, Bussey Institution (a school of Agriculture), Arnold Arboretum, the University Library, Museum of Comparative Zoology, Peabody Museum of American Archaeology, the University Museum, Botanic Garden, Gray Herbarium, and the Astronomical Observatory. Radcliffe College for women is also a part of Harvard. The finest building is Memorial Hall, built in honor of the alumni who fell in the Civil War.

Yale University, known as Yale College until 1887, is at New Haven, Conn., and takes rank with Harvard as one of the best institutions in the country. It was founded in 1701, and in 1901 celebrated its bicentennial. It includes, besides the college or academical course, schools of law, theology, medicine, philosophy and arts. The school of fine arts, with its gallery of Italian pictures, and the Trumbull collection of 54 pictures, the Peabody Museum, the Sheffield Scientific School buildings, Marquand chapel, Osborn hall. Vanderbilt hall, the bicentennial buildings of 1901 and the library are among the noticeable structures. There are 600 instructors and about 4,400 students. Johns Hopkins University, founded in 1876, at Baltimore, Md., resembles the German universities in its methods. The work is largely graduate work, and the teaching is mainly by lectures. It was endowed by Johns Hopkins with a fund of $3,500,000. Higher mathematics and history are among the subjects in which special work is done. Clark University, at Worcester, Mass., founded in 1888, is an institution for graduate work only.

The state institutions are all called universities, but only in a few is the university system fully developed. The University of Michigan, at Ann Arbor, is one of the largest, with about 750 instructors, and over 10,500 students. It has departments of law and medicine. Chicago University, though opening only in 1892, already ranks among the great universities of the country. Its courses are so arranged that students can be admitted at any time, as there is instruction during the whole year. It has 1,375 instructors, selected from the best institutions in America and in Europe, and 12,000 students. Many institutions of learning bearing the name of university in the United States are founded and carried on by the different religious denominations, as the Wesleyan Universities at Delaware, O., and Middletown, Conn., and De Pauw University at Green Castle, Ind., all under the direction of the Methodists; while Brown University at Providence, R. I., belongs to the Baptist denomination, as do the University of Rochester and Dennison University. Most of the universities, both of Europe and of the United States, are mentioned under the name of the place where they are situated, but a full account of the numerous institutions called universities has not been attempted. See articles under titles as above and COLLEGES.

University Exten'sion, a branch of educational work of English origin, whose object is to extend the advantages of higher education to the people at large. The university center organizes lecture courses along lines likely to be popular with the surrounding population, especially in such subjects as literature, economics, art, history and science, and sends out, upon request, a lecturer, usually one of its own professors, to give a series of lectures at intervals of one week or two weeks in some one general field. The success of these lectures depends largely upon the ability of the lecturer to adapt his matter to the interests and capacity of his audience.

The best university extension centers use various means in addition to the lectures to enhance results. Syllabi of the courses, with references for home reading, are often given, and selections of books known as travelling libraries loaned by the university. Discussions and questions at the close of the lecture or special classes for discussion give a vital touch to the subject, and enable the lecturer to drive home the main principles and explain obscure points. In some instances local examinations are held at the close of the series of lectures, and university credit given. A small fee is usually charged for lectures.

University of California, one of the largest and most important state universities in America, is situated at Berkeley, Cal., on San Francisco Bay. The view over the bay is strikingly beautiful. In addition to the buildings at Berkeley, which include an open air auditorium, built in the Greek style and with a seating capacity of 7,500, the University maintains the Lick Observatory on Mt. Hamilton; a University farm at Davisville, Yolo County, where practical agriculture and related sciences are taught; a laboratory of plant pathology at Whitten and a marine biological laboratory near San Diego. Its usefulness is greatly broadened by a department of university extension, and an institute of medical research founded in 1913. The growth of the university has been very rapid. In athletics a system of football has been developed which, it is asserted, is more scientific than the Rugby and safer than the American game. It is a result of study and experiment and has been carefully worked out.

University of Chicago, The, at Chicago, Ill., is the successor to a Baptist University of Chicago (1857-86) whose graduates are considered alumni of the present institution. The old college showed the interest of Chicago, from its youth, in higher education, and it did good work. When it died, Mr. John D. Rockefeller (*q. v.*) suggested to the American Baptist Educational Society that it be revived. Mr. Rockefeller himself contributed the greater part of the endowment, having in all given the new institution $23,924,322. Marshall Field (*q. v.*), S. A. Kent, Martin A. Ryerson, Miss Helen Culver, Mrs. Emmons Blaine and many other Chicagoans have donated over $3,000,000 more. Mr. Charles Yerkes contributed $300,000 for the erection of the university's observatory at Lake Geneva, Wis., and for placing the largest telescope in the world in it. The result was the organization of Chicago university. It was chartered in 1890, Dr. William R. Harper (*q. v.*) was called from Yale Divinity School to become its president, and teaching began on Oct. 1, 1892. The president and two thirds of the trustees must be Baptists, but the university is nondenominational as well as coëducational.

The university, in its organization, enjoyed every advantage that American ability and aspiration, the fullest educational experience and knowledge and the command of enormous financial resources could give. It was therefore planned on the broadest lines and with a special view to growth and change in the future, so that it shall, as far as men can foresee, adapt itself in every way to the demands of modern life as they arise. It therefore emphasized graduate study and research work; established study in summer as well as in autumn, winter and spring, thus adding 25% to the working year; gave an important place to university extension (*q. v.*); founded a system of affiliated colleges and schools whose students have special privileges in the university; and employed so large a corps of teachers that classes can be kept small, however many the students, and each individual receive personal attention. The university is organized into the five departments of schools, colleges and academies; university extension; libraries, laboratories and museums; the press; and affiliated schools. The first department includes schools of divinity, education, law, medicine and science, to which are to be added schools of fine arts, music and technology colleges of arts, of commerce and administration, of literature, of science and University College; and numerous affiliated academies or preparatory schools. The divinity school includes five theological seminaries. The medical school has Rush Medical College affiliated with it. The commercial college teaches banking, journalism, trade and industry and transportation. University College is designed chiefly for teachers, and is conducted in the center of Chicago (*q. v.*) by the university. The university's extension offers courses by correspondence and lectures in the same subjects as the university itself, and the student who completes courses in the extension receives credit as a student in the university, which by means of this department comes into touch with the people and with public education.

The courses continue 12 weeks or six, each requiring four or five hours a week in the class. Teachers and others outside the university attend largely in summer, and every year more and more students themselves attend them. A few students reside in the houses of their societies, about a third in dormitories on the campus, but the greater part elsewhere in the city or in suburbs.

The grounds and buildings occupy a tract at 59th street (Midway Plaisance), between Jackson and Washington Parks, about seven miles from the heart of the city. The buildings, which are beautiful and very numerous, are in the English Gothic style of architecture, and grouped impressively on a plan of quadrangles. There are about 1,375 instructors and over 12,000 students. The requirements for admission are as severe as those of any American college or university, and the standard of scholarship is high. Consequently the university stands in the front rank of American schools of higher learning. The University Press publishes a number of important periodicals, including *Biblical World, American Journal of Political Economy, Journal of Geology, Botanical Gazette, Elementary School Teacher* and *School Review.*

University of Colorado, a state institution, is at Boulder, and was first opened in 1877. Its organization comprises a college of liberal arts, school of applied science, school of medicine, school of law, college of dental surgery and school of music. It also provides graduate courses. It is open to students of both sexes. The faculty numbers 210, the students 3,000, including the preparatory school. The library has 60,000 volumes. See COLORADO.

University of Illinois, at Urbana, Ill., was founded by the state upon the donation by the national government of scrip for 480,000 acres of land. On account of this grant the state pays the university interest at the rate of five per cent. on about $495,000. The university was incorporated in 1867 as Illinois Industrial University, and was opened to students in 1868. In 1885 the legislature changed the name to University of Illinois. It includes the college of literature and arts, college of engineering, college of science, college of agriculture, graduate school, school of library science, school of music, college of law, college of medicine and school of pharmacy. Its yearly income amounts to $5,000,000, the state appropriating $700,000. It has 1,100 instructors, 10,000 students and 151,481 volumes in its library. See ILLINOIS.

University of Kansas, at Lawrence, was established by an act of legislature in 1864, and is an integral part of the public-school system. The university embraces a graduate school, school of arts, schools of engineering, law, fine arts, medicine, and pharmacy. The faculty numbers 320, the students 3,800 and the library 80,000 volumes. See KANSAS.

University of Michigan, The, was chartered in 1837 and began work in 1841 at Ann Arbor. It is a part of Michigan's system of public education and is controlled by regents elected by the people for eight-year terms. The university includes the departments of art, literature and science; engineering; law; medicine and surgery; pharmacy; the homeopathic medical college; and dental surgery. The courses in each department cover each branch of collegiate, professional or university study. The departments of art, literature and science, medicine and law also hold sessions in summer. The standard of scholarship is exceptionally high, and Michigan has long stood in the front of universities. It was a pioneer in coëducation, admitting women in 1870. It has many valuable collections and libraries, two observatories, two hospitals and two gymnasiums. The faculties number 750 instructors, the students 10,500, and the libraries, 300,000 volumes. In 1907 the income, including the appropriation from the state, was $1,078,417. Students are charged only small fees, those from Michigan paying less than students from other states.

University of Minnesota, at Minneapolis, is a state institution and was first organized in 1851, but dates its actual beginning from its reorganization in 1868. The university comprises the graduate department, college of science, literature and the arts, college of engineering and the mechanic arts, school of mines, college of agriculture, college of law and department of medicine. It also has charge of the experiment-station and the geological and natural history survey. Students of both sexes are admitted, and the total enrollment, exclusive of summer schools, is 10,000. The faculty and instructors number 1,300. The library has 225,000 volumes. See MINNESOTA.

University of Notre Dame, two miles from South Bend, Ind., was founded by the Very Rev. Edward Sorin in 1842. It provides courses in the departments of arts and letters, science, architecture, civil, mechanical and electric engineering, law and pharmacy. The faculty number 135, the students 2,500 and the library 125,000 volumes.

University of Oregon, is at Eugene, 125 miles south of Portland. It is a part of the public-school system. The organization comprises colleges of literature, arts, science and engineering and schools of mines and mining, medicine, law and music. It has 103 instructors, 1,420 students and a library of 20,000 volumes. See OREGON.

University of Vermont and State Agricultural college is located at Burlington. It has a faculty of 150, 1,300 students and a library of 125,798 volumes. See VERMONT.

University of Wisconsin. See WISCONSIN, UNIVERSITY OF.

U'pas, a tree belonging to the mulberry family, found in Java. It grows over 100 feet high, with a straight trunk and oval leaves covered with down, and a purple fruit, something like a small, rather long plum. It was long called the deadly upas and believed to be very poisonous, so that all animals going near it were killed, and even other trees and plants — travelers finding it growing solitary in a barren waste with the bones of its victims around it. But, instead, it is found growing in the forests, and animals do not seem to avoid it. Many specimens have been collected without injury, and the tree now is in the principal botanical gardens of Europe. Its poison is similar in its effects to the poison-ivy, and is found in the juice of the tree, and used by the natives on the points of their arrows. They also make a cloth from the inner bark of the tree, which, if it gets wet, produces a disagreeable itching. Bags are made from the tough bark of one species of upas. See POISONOUS PLANTS.

Up'per Can'ada Col'lege, Toronto, was founded in 1829 by Sir John Colborne (Lord Seaton). It is modelled after the public schools of England. One hundred and fifty resident pupils are comfortably accommodated. It is beautifully located in spacious grounds in Deer Park on a hill at the northern limits of the city. There also is classroom accommodation for 150 day-pupils. The college prepares for university, honor matriculation for entrance to military schools and medical colleges. It has an infirmary, swimming tank, skating rinks, cricket grounds, etc. Its cadets' rifle-corps is one of its interesting features. It is well-provided with scholarships and prizes. The preparatory school has proved attractive. The Board of Governors has purchased a site of six hundred acres twenty-five miles from Toronto, and plans for the new buildings involve an expenditure of $600,000.

Upsala or **Uppsala** (*ŭp-sä'lä*), a city in Sweden, on Sala River, 40 miles northeast of Stockholm. It is in a fertile plain with fine buildings and parks. The cathedral, begun in the 13th century, is the most celebrated in Sweden. The university, founded in 1474 and richly endowed by Gustavus Adolphus, has fine buildings, over 70 instructors and 1,835 students. There are also connected with it a botanic garden, a mineralogical collection, a museum and an observatory. Population 24,450.

Ur of the Chaldees, mentioned in *Genesis xi: 27-32* as the point from which the family of Abraham migrated to the west, has been identified with a city of southern Babylon, near the Euphrates. This city was the seat of a dynasty of kings before it fell under the sway of Babylon. Yet there are indications that the home of the family of Abraham was higher up the Euphrates than the city of Ur (the modern Mugheir), so that the identification is not certain. The ruins of Ur at Mugheir still stand; their most conspicuous feature being a temple to *Sin*, the god of the moon.

U'ral Mountains, a part of the boundary between Europe and Asia, separate European Russia from Siberia. The chain is made of a series of parallel ridges in the southern part, running toward the northwest, the highest summit being 4,680 feet. Farther north there are several low ridges, with peaks reaching 5,115 feet, while one low ridge in the extreme north completes the range. The middle part of the range is very rich in minerals, having mines of gold, copper, platinum and iron. Precious stones, as the emerald, beryl, topaz, amethyst and diamond, are also found. The population inhabiting the mountains and supported by the mines is 200,000.

Ural, a river of Russia, separating Europe from Asia. It rises in the Urals, flowing south and southeast for 1,100 miles and emptying into the Caspian. There is very little navigation. Its banks have been fortified by a line of forts, and its fisheries are very valuable.

Ura'nium, a metal first isolated in 1842 from the oxide of uranium, discovered previously by Klapworth. It is found in uranite or pitchblend in Bohemia, Saxony and Cornwall, England, and is prepared by heating a mixture of uranium chloride and sodium chloride with carbon or, preferably, with metallic sodium. It, with its other mineral compounds, possesses a notable radio activity, emitting rays which have a photographic action and make phosphorescent substances luminous.

U'ranus, in Grecian mythology, is sometimes the son, but generally the husband, of Gæa the earth, by whom he became the father of Oceanus, Saturn, the Cyclops and others. He hated all his children, and confined them in Tartarus; but Cronus, at the instance of his mother, overthrew and dethroned him.

Uranus. See Planets.

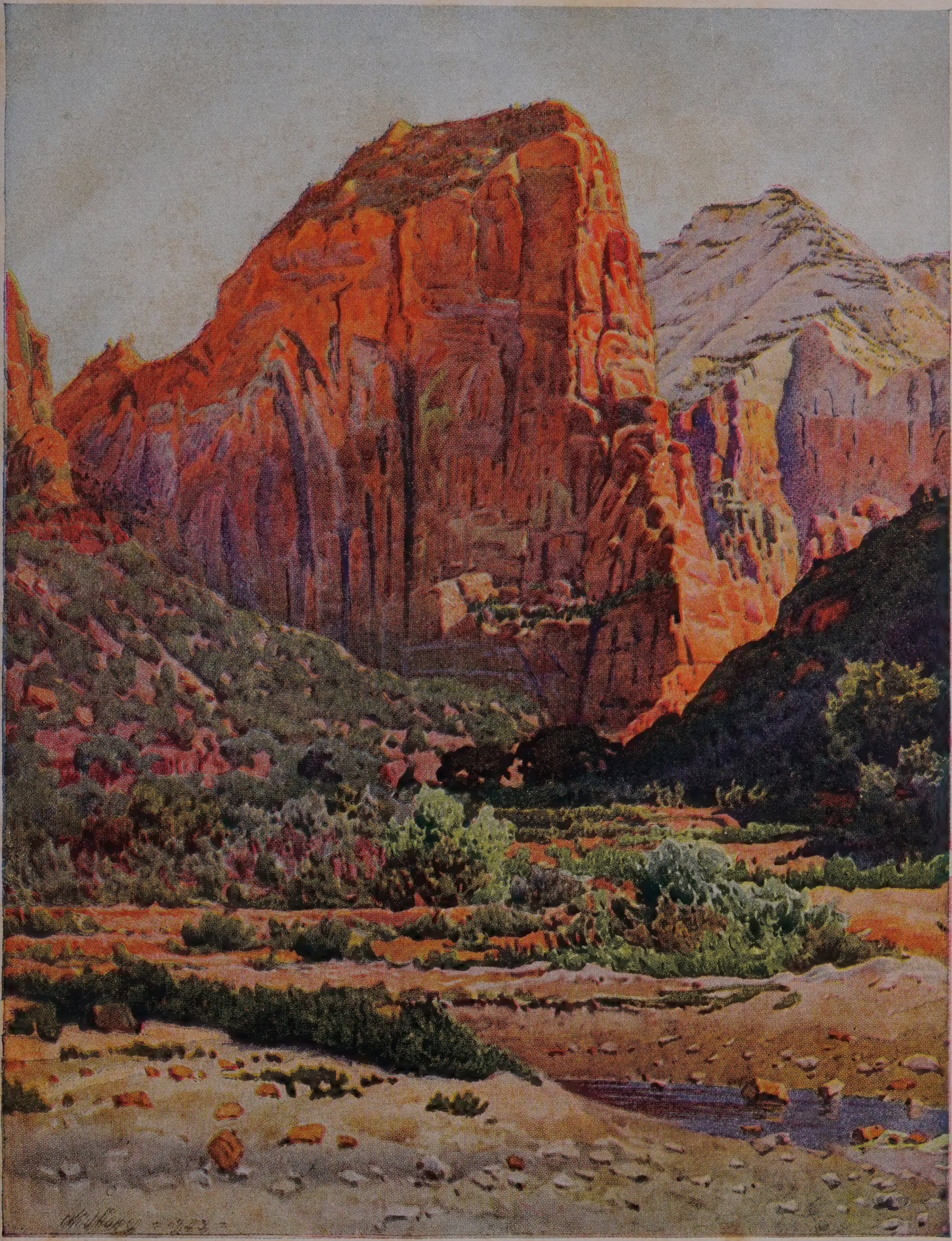
Ur'ban, the name of eight popes, of whom the following deserve special mention:

Urban II, a Frenchman by birth and originally a monk of Cluny, was elected in a council held at Terracina in the year 1088. His name was Otho, and soon after his election he resumed possession of Rome, the fortresses of which had been held by the antipope Guibert, styled Clement III, whom he compelled to withdraw. A great council was held in Piacenza in 1095, in which the antipope and his adherents were excommunicated; and at the same council the crusade was proclaimed. Urban died in 1099, just when the crusade which he had organized was ending in the occupation of Jerusalem.

Urban V (originally William de Grimoard) was the last of the popes who resided at Avignon. By him the papal seat was retransferred to Rome. He was elected pope on the death of Innocent VI in 1362 and died in 1370, leaving the reputation of great piety and of zeal for religion and good morals.

Urban VI, whose name was Bartolommeo Prignani, was the pope under whom the great western schism had its origin. On the death of Gregory XI in 1378, Prignani was elected in a conclave held at Rome in circumstances of great excitement, owing to the apprehensions of the populace that a French pope would be elected and Rome again abandoned. Prignani was crowned under the title of Urban VI, but immediately afterwards 12 French cardinals assembled at Anagni and revoked his election, declaring that they had voted for him under fear of violence. They were joined by three Italian cardinals, and then proceeded to elect the cardinal-bishop of Cambray pope under the title of Clement VII. Clement took up his residence at Avignon, but Urban remained at Rome, where he appointed a number of new cardinals and excommunicated Clement and his adherents. The result was that Urban was recognized as lawful pope by one portion of the church and Clement by the other, each maintaining his claim by extreme measures. Urban was besieged by Charles, king of Naples, at Novara, whence he withdrew to Genoa, taking with him as prisoners those cardinals of his party with whom he had quarreled, several of whom he is said to have put to death. He died in 1389 from injuries sustained in a fall from his horse.

Urban VIII, the successor of Gregory XV, whose family name was Maffeo Barberini, was born at Florence in 1568. After



Gunnar Widforss

ANGEL LANDING, ZION NATIONAL PARK

Beautiful natural scenery like this attracts thousands of visitors each year to the large National Parks the United States has set aside for the people. Alice saw wonderful spots like this when she was in Yellowstone Park.

many years of service in various capacities, he was elected pope in September of 1623. His memory has suffered through the imputation of nepotism; but his pontificate on the whole was vigorous and enlightened. He was the founder of the celebrated College of the Propaganda, and to him Rome is indebted for many public works, including large and important additions to the Vatican library. His pontificate was also distinguished by the acquisition of the duchy of Urbino to the Holy See in 1626. He died in 1644, and was succeeded by Innocent X.

Urban'a, Ill., county-seat of Champaign County, is noted as the seat of the University (*q.v.*) of Illinois. There also are a good system of public schools, a high school and two libraries. Urbana's most important industrial establishments are the "Big Four" car-shops, employing 700 men, next the brick-works and then the lawn-mower and machine works. Population 12,000.

Urbino (*ŏŏr-bē'nŏ*), in central Italy, is situated between the Metauro and Foglia Rivers, 20 miles southwest of Pesaro. It has a magnificent palace, once the residence of the dukes of Urbino, where was the famous library of the Della Rovere family, afterwards removed to the Vatican. Another handsome palace is that of the Albini, a family who gave the church Pope Clement XI. Urbino is the birthplace of Raphael, and became a part of the kingdom of Italy in 1860. It is the seat of a free university founded in 1564. Population of Pesaro and Urbino 25,103.

U'rim and Thum'mim, a mysterious contrivance on the breastplate of the Jewish high-priest, either consisting of the four rows of precious stones upon which the names of the 12 tribes were engraved or of two images personifying — most probably — Truth and Revelation. Others assert that the words personified by these images were Light and Perfection, and still others that they were Doctrine and Judgment. The consulting of the Urim and Thummim as an oracle was a very solemn ceremony with the Jews, but it is never mentioned after Solomon's time.

Ur'sa Ma'jor. See BEAR, GREATER AND LESSER.

Ursa Mi'nor. See BEAR, GREATER AND LESSER.

Ur'sula, St., a female saint and martyr, especially honored in Germany and Cologne, the place of her reputed martyrdom, who is variously assigned to the third, the fourth and the fifth century. According to the legend, she was the daughter of Deonatus, a British king, and on account of her beauty was sought in marriage by the son of a pagan prince. Fearing that she might bring ruin upon her father by a refusal, she consented to marry the prince, but made it a condition that she should be allowed three years, during which she proposed to make a pious pilgrimage in company with her ten maidens, each being accompanied by a thousand other maidens, making 11,000 in all. The maidens were collected from all parts of the world, and the expedition set sail from the British coast. Arriving at the mouth of the Rhine, they sailed up the river to Cologne and thence to Basel. Leaving their galleys, they proceeded by land to visit the tombs of the apostles at Rome. This pilgrimage accomplished, they returned down the river to Cologne, which had meanwhile fallen into the hands of an army of Huns under the leadership of a chief, who, although not named, plainly is the Attila of history. Landing at Cologne in ignorant security, the pious virgins fell into the hands of these barbarians, by whom all were seized and put to death. A host of angel warriors, however, interposed and smote the cruel Huns; and in gratitude to their martyred intercessors the citizens erected a church on the site now occupied by the Church of St. Ursula.

Ur'sulines, a religious order of women in the Roman Catholic church, taking their name from Saint Ursula. They derive their origin from Angela Merici, who, early in the 16th century, formed at Brescia an association of young women who fully devoted themselves to the care of the sick, the instruction of children and the relief of the poor. In 1565 a house was opened at Cremona, and the order spread over several dioceses in Italy. Soon afterwards it was established in France, where one of its members was the celebrated Madeline St. Beuve. It was in France that the sisters added to their vows the instruction of female children, which has since formed the most marked characteristic of their order.

Uruguay (*ōō'rōō-gwī'*), the smallest of the South American republics, is 53 times the size of Rhode Island, the smallest state of the Union, and nearly equal to the combined area of Ohio and Indiana. It lies between Brazil on the north and northeast and the Argentine Republic on the west, with the Atlantic Ocean on the south and southeast. Its greatest length and breadth are a little over 300 miles each, the total area being 72,210 square miles. Brazil, the largest of the South American countries, is 43 times the size of Uruguay. Uruguay is considerably further east than the eastern limit of the United States, being directly south of Newfoundland. Its population is 1,112,000.

Surface and Climate. Uruguay is a country of hills and plains, with no elevations exceeding 2,000 feet. In the south the country is a sort of terraced upland, with a treeless coast possessing some good harbors. Rio de la Plata, a broad deep estuary, and Uruguay River, with their tributaries, furnish easy and ample water-communication with the interior. There are 1,273 miles of railways, 4,916 of telegraph, 11,414 of telephone and 5,340 of roads. The climate is mild and on the coast is equable, but in the interior is subject to sudden changes. The rainfall is abundant, averaging 40 inches annually; it is heaviest on the coast.

Resources. The wealth of the country consists mainly in its pasturage, which supports large herds of cattle, horses and sheep, the wool of Uruguayan sheep being of superior quality. The latest record reports 9,000,000 cattle; 20,000,000 sheep; 1,000,000 horses; and 60,000 mules. The value of exports in 1911 was $47,380,000. Agriculture is growing in importance, wheat and corn being the chief crops; flaxseed, barley and oats are also raised. Of manufacturing establishments the most important are packing-houses, flour-mills, furniture, cigar and carriage and wagon factories.

Government. The president is elected by a general assembly; his term is four years and he is not eligible for a succeeding term The general assembly consists of two houses, a senate and a chamber of representatives. A vice-president presides over the senate. The republic is divided into 19 departments, the chief executive of each being appointed by the president.

Cities. The chief cities are Montevideo, the capital and chief port, population 291,465; Paysandu (12,000), a port on Uruguay River; Salto (14,000); Mercedes (10,000); and San José (9,000).

Education and Religion. Primary education is obligatory. In 1906 there were 619 public and 289 private schools. The first had 1,218 teachers and 57,638 pupils; the second, 289 and 17,242 respectively. In 1907 it was arranged that 150 public schools be added. At Montevideo are an university, a preparatory school and an institute of experimental hygiene. In 1905 the university had 112 professors, 530 regular students and 661 secondary pupils. There also are a military college, many religious seminaries, normal schools and a state school of arts and trades. But half of the population over six years old is illiterate. Roman Catholicism is the state religion, but there is complete toleration.

History. Uruguay was discovered by Solis of Spain in 1515, and colonized by Sebastian Cabot in 1527. The Indians, however, successfully resisted Spanish attempts at settlement until 1624, when the oldest city was founded. Spain and Portugal quarreled over the possession of Uruguay, and the Brazilians and Argentines continued the quarrel until 1828. In 1811 the Spanish in Uruguay, whose ancestors had from 1726 colonized Montevideo from Buenos Aires, threw off the yoke of Spain, and the settlements formed a confederation. The Brazilians in 1822 made it a province of Brazil, but in 1828 united with Argentina to make Uruguay an independent republic. For 80 years, however, it has suffered almost incessantly from internal discords. Consult the Bureau of American Republics' bulletins and *Handbook of Uruguay* and Cattell's *Foreign Commercial Guide.* See America (South), Argentine Republic, Brazil and Paraguay.

Uruguay, a river of South America, rises in southern Brazil. It flows westward a little less than 100 miles, and then southward, forming a boundary line between the Argentine Republic on the west and Brazil and Uruguay on the east. It unites with the Paraná to form the Plata in 34° S. latitude, its total length being about 1,000 miles. Its chief branch is the Rio Negro.

Urumiah (*ōō′rŏŏ-mē′ȧ*), a town of Persia (*q. v.*), ten miles west of Lake Urumiah, in a wide and fertile plain, is surrounded with a mud-wall but has no gates. Extensive fruit and vegetable gardens are situated both within and without the walls. The houses of the richer classes are lofty and spacious, and many of those of the poor are adorned with flowers and vines. The city is the seat of a Nestorian bishop and of an American Presbyterian mission, which is in a very prosperous condition. The city is said to have been the birthplace of Zoroaster (*q. v.*), founder of the religion of ancient Persia, and has a population of 30,000.

Urumiah, the principal lake of Persia, is about 4,000 feet above the level of the sea, and nowhere exceeds 20 or 25 feet in depth. It is about 80 miles in length, with an average width of about 25 miles. Its waters are largely impregnated with salt, and are so heavy as to be little ruffled by the strongest wind. No fish are found in it, although several rivers empty into the lake. Its average depth is only about 12 feet, and it is fast drying up, leaving a gradually widening beach of salty crust, which supplies the whole of Kurdistan with salt.

U′sury. This word originally meant anything charged by the lender of money for the use of it; but it now refers to any charge above the legal rate. In most, if not all, civilized nations there are laws limiting the rate which lenders of money may charge for its use, with greater or lesser penalties for all charges which go above this limit. In the United States the laws of the states vary somewhat in this respect, although in all of them a legal rate is established for cases where there is no express contract — six per cent in nearly all the states — and another limit prescribed — generally eight or ten per cent. — within which contracts may be made by the parties, and beyond which contracts are rendered void or at least cannot be enforced by law.

U'tah (named from the Ute Indians), a western state of the Union, a trifle larger than Idaho; area 84,970 square miles; breadth 275 miles; extreme length 345. It is bounded on the north by Idaho and Wyoming, on the south by Arizona, on the west by Nevada and on the east by Wyoming and Colorado. The state, which ranks eighth in size, was first settled by the Mormons in 1847, and by them called Deseret. It occupies an elevated plateau, at an average altitude of 5,000 feet, from which mountain-peaks rise 11,000 to over 13,600 feet, with correspondingly deep valleys. The Wasatch range forms its chief topographical feature in the northern and middle regions, with the notable water-basin of Great Salt Lake northeast of the Great American Desert and north of Utah Lake. The population of the state in 1900 was 276,749, but it has now nearly doubled being 500,000. Its capital is Salt Lake City. Other chief cities: Ogden, Provo City, Logan. Utha ranks first in silver, third in copper and lead production.

Surface and Drainage. Besides the high, central Wasatch range, with its eastward spurs known as the Uintah Mountains, there are many other elevations southeast and west. The chief ones are Needle, Wah-Wah, Beaver River, Parowan, Henry, Deep Creek, Abajo, La Salle, Thomas, Desert, Terrace and Goose Mountains. From these ranges soar lofty peaks, as Mts. Peale and Gilbert and Emmons, Wilson, Hodges, Tokewanna and Lovenia Peaks, each of which exceeds 13,000 feet in height. The lake and river drainage also is considerable and varied, embracing (besides Great Salt Lake, 2,500 square miles in extent) Lake Utah and Bear and Sevier Lakes and Green, Grand, Colorado, Snake, Bear, Sevier, Virginia, Jordan and San Juan Rivers. In San Juan County, in the uninhabited and almost inaccessible southeast, are the greatest natural bridges in the world. Emery Knowles discovered them in 1895. They number three. Augusta Bridge is 265 feet in height, 35 in width, 83 in thickness and 320 in span; Caroline 182, 60, 60 and 350 feet respectively; and Edwin 111, 30, 10 and 205 This is the slenderest and most graceful bridge. Each consists of light sandstone. The mountains around rise 11,000 to 13,000 feet.

Resources, Mining and Agriculture. The natural resources consist of the yield from minerals and from agricultural operations almost entirely. The annual production of wheat amounts to 5,708,000 bushels; of oats to 2,404,000 bushels; of corn to over 1,394,000 bushels; of beet sugar to nearly 600,000 tons. The area annually devoted to crops is 1,700,000 acres, embracing hay and forage, besides the cereals named. The minerals include coal, of which over 5,000,000 tons are mined; copper, the yield of which is now over 250,000,000 pounds; silver 19,445,900 ounces, ($15,640,000); gold $3,000,000 (the yield being 150,000 ounces); and lead, 240,000,000 pounds. Other mined products embrace clay, salt, zinc, bismuth, iron, cement and building-stone. The annual wool-product amounts to 4,819,500 pounds. Utah has over 246,000 sheep, 125,000 dairy cows, 376,524 neat cattle and 117,953 horses and mules.

Manufactures. There has been considerable progress in the development of manufactures in recent years. The number of industrial establishments is now about 750, employing some $52,600,000 of capital and turning out products to the aggregate value of $61,989,000. The two principal industrial centers are Salt Lake City and Ogden, the leading industries throughout the state being the smelting and refining of copper and lead ore, flour and grist-mill products, engineering work, railway repairing, printing and publishing, confectionery manufacture, cheese and butter making, the preserving and canning of fruits, vegetables and condensed milk, together with foundry and machine output, the brewing of malt-liquors and cattle-slaughtering and meat-packing.

Commerce, Finance and Transportation. The railway mileage of the state is 1,985 miles, the more important lines being the Rio Grande Western, the Oregon Short Line, the Central Pacific, the Los Angeles and the Union Pacific. There are eight short lines also. The expenses of the state are met by a property tax, which includes mines and mining property. There are now 21 national and 68 state banks. Brigham Young organized the first national bank in 1873.

Education. The school-system is under a board, aided by a state and a county superintendent. Education is free, as are the text-books. Education from 8 to 16 is compulsory. Illiteracy is only 5% of the population, and half of the 6,141 illiterates are foreign-born. From a school population of about 105,000 the annual enrollment is 87,721; while the average daily attendance is 69,246. Normal schools for the training of teachers are maintained at Salt Lake City in connection with the state University of Utah and also at Cedar City. Higher education is represented by the University of Utah, which has 125 instructors and 810 students; by Brigham Young College at Logan (Latter Day Saints) with 32 instructors and 704 students; and by Westminister College (Pres.) at Salt Lake City; there also is an agricultural college at Logan. The state university is co-educational, and, besides its normal-school department, has a school of mines and a school of arts and sciences.

History. Though the first settlement of note was made in 1847 at Salt Lake City by Mormons under Brigham Young, who were driven out of Nauvoo, Ill., the region (organized as a territory in 1850 and admitted to statehood in 1896) has an early history. This includes the visit of Spanish explorers in or about 1540 and the exploration of Colorado River. Seeking a route from Santa Fé to Los Angeles and the Pacific, two Franciscan friars in 1776 visited Utah and Sevier Lakes, where trading and hunting parties were afterwards organized. In 1824 Great Salt Lake was discovered by Capt. Jas. Bridger, a trapper, who was seeking to trace the course of Bear River. Posts were established later, which were welcome to immigrants passing through the territory to Oregon and California, as also to the bands of traders and hunters who now began to operate in the region. Among these posts was Fort Ashley, built in 1825 and for a time occupied by an expedition under William Ashley. Later expeditions were those under Capt. Bonneville and John C. Frémont, the report of the latter, it is related, being instrumental in inducing the Mormons to come, though the Mexican War was in progress. Following the band of 150 Mormons that arrived in 1847 with Brigham Young, there came others to the colony at Salt Lake City, the region meanwhile having passed (1848) from Mexico to the United States. Under the Mormon Church the state of Deseret, as it was called, was organized in 1849, while appeals were made to Congress for admission into the Union. This was refused, though the federal executive in 1850–1 created the territory of Utah and appointed Brigham Young as governor. For six years Young held office, the Mormon colony being considerably added to by proselytes and new arrivals while he was governor, though the region began to be populated by non-Mormons. Between the two sets of colonists there arose opposition, while trouble also came from the territorial officers sent by the federal government, who were opposed and interfered with the rule of the Mormon Church, tenacious of its power and hold upon the region. In 1857 such were the difficulties that arose from the rival control of affairs, which more than once manifested itself in violence and attempts at mob-rule, that the federal authorities determined to supersede Young in the governorship, and for that purpose and to subdue disaffection sent troops to Salt Lake City, deposed Young and appointed a new governor. The outbreak of the Civil War for a time diverted federal vigilance over matters in the territory, but soon antipolygamy legislation arose and ere long dealt drastically with Mormonism. Immigration of an anti-Mormon character helped to neutralize the rule of the church, while the Edmunds bill of 1882, following other expedients of a legislative character, disfranchised all polygamists and abolished many of the officers in the territory and with them the corporation of the Mormon Church, while the property of Mormons was escheated. So threatening and adverse to the church and its organizations was the aspect of affairs, that in 1890 President Woodruff, the head of the church, was necessitated to issue an ordinance discountenancing polygamy,—a timely action which met the approval of a general conference of the Mormon Church. Polygamy, nevertheless, continued for a time further to be practiced, and the taint of it so affected at least one senator from the state that he was not allowed to take his seat. In the case of another senator the national senate took action to inquire into the prevalence or existence of polygamy since 1890; but whatever there was, as time passed, was neutralized, kept in abeyance and finally stamped out by local prejudice against it among the anti-Mormon element in the state, while the rise and influence of political parties on national lines were effective in expunging the obnoxious practice and clearing the state of the immoral taint. The constitution given the state in 1895, just a year before the admission of Utah to statehood, forbade polygamy. In 1905 settlement was extended by the opening of the Uinta Indians' reservation. The organization of the Mormon Church or Latter Day Saints, as they are called, continues to exist, though division has entered into their ranks and made two folds of them — one the Utah branch with 700 ministers, 796 churches and about 300,000 members, and the other, a Reorganized Branch, with headquarters at Lamoni, Iowa, which numbers about 50,000 with 860 active ministers. Consult Jones' *Utah* and Bancroft's *The Pacific States.* See Mormons.

Utahs or **Utes,** a tribe of Indians formerly roaming over Utah, Colorado and New Mexico, but now occupying reservations in Utah and Colorado. Their number is about 5,000.

U'tica, an ancient city of Africa, near the Bay of Carthage and a short distance from the site of the modern city of Tunis. The Tyrians are said to have founded it 287 years before Carthage was built. It was an ally of Carthage in her early wars with Rome. But in the third Punic War Utica early made separate submission to Rome, and, when Carthage fell, was rewarded with a part of her territory. The Roman governor made his residence there. In the accounts of the struggles between Sulla and Marius and between Cæsar and Pompey it is often referred to as an important city. It had an amphitheater, which would seat 20,000 people, and an artificial lake on which mimic sea-battles were fought. Its water-supplies were stored in many immense cisterns, some of which are 136 feet long, 19 wide and 20 or 30 deep. Augustus made it a free city. The Vandals conquered it in 439, then the Byzantine emperors recovered and held it till the 8th century, when the Arabs conquered and destroyed it.

Utica, N. Y., county-seat of Oneida County, on Mohawk River, 95 miles from Albany and 52 miles from Syracuse. The city is regularly and handsomely built, and rises from the south bank of the river to an elevation of 150 feet. One of the state hospitals for the insane is here, with a number of other benevolent and charitable institutions. The manufactures amount to 100 millions annually, and comprise a great variety of products. The annual cost of maintaining the public schools is $440,000; the number of teachers employed is 500; and there are 20,000 pupils enrolled. At the Revolutionary War Utica was a frontier trading-post, and also was the site of Fort Schuyler, built to guard a settlement against the French and Indians. Population, 120,000.

Uto'pia is the name given by Sir Thomas More to the imaginary island which he makes the scene of his work, entitled *Utopia* (from Greek words meaning nowhere), first published in Latin in 1516 and translated into English by Bishop Burnet. This island, which More represents as having been discovered by a companion of Amerigo Vespucci, is the abode of a happy society, free from all the cares, anxieties and miseries of mankind. In this community all property belonged to the government, no private ownership being allowed; and the wants of all persons were supplied from the common stock. More's work, which is still published, attained a great popularity, and the epithet Utopian is still applied to all plans for the improvement of society that are deemed visionary and impracticable. A counterpart to More's work is found in a production of the present day, entitled *Looking Backward*, by the late Edward Bellamy. See COMMUNISM, MORE and SOCIALISM.

Utrecht (*ū'trĕkt*), a city of the Netherlands, capital of the province of Utrecht, is beautifully situated in a district of rich, grassy meadows, extensive orchards, flower-gardens and cultivated fields. It is favorably situated for trade, being the point from which several railroads radiate and having excellent water-communication by way of the old Rhine and the Vecht. Utrecht is one of the oldest cities of the Netherlands, and probably was founded by the Romans. It was here that the union of the northern provinces for the defense of their political and religious freedom against the tyranny of Spain was formed on Jan. 23, 1579. It is the seat of an university. Population 118,386.

Utrecht, Treaty of. The treaty or treaties of peace concluded in 1713 between France and the allied powers — England, Austria etc. — after the ten years' war relating to the Spanish succession. Consult Macaulay's essay reviewing Lord Mahon's *History of the War of the Succession in Spain.*

V

V (*vē*), the twenty-second letter, is a vocal consonant. Being made by the lips or by the upper teeth and lower lip, it is classed as a labiodental, as in *vain*, *vivid*, *lived*. Nearly every English word beginning with *v* comes from French or Latin. No English word ends with *v*, nor is *v* ever doubled. The Romans used V as a numeral (5) as well as a letter. Until recently words beginning with *u* or *v* were grouped together. *V* is more easily engraved than *U*, especially on stone.

Vacation Schools are the result of an extension of the public-school system in New York City, Chicago, Newark and other centers of population throughout the country. They originated in New York as a philanthropic experiment conducted by a private society. It was recognized by the city authorities that the success of the experiment was worthy of public recognition; and playgrounds and vacation schools were accordingly established in connection with the public-school system. The vacation schools of New York are administered by a district superintendent and a number of special directors under his supervision. In the vacation schools manual and artistic activities are exercised to a high degree. Music and dancing are provided for on roof-gardens where the open, fresh air may be enjoyed. There are even baths where swimming is taught. But the vacation school is by no means a place for recreation merely, unless the term recreation be extended so as to include many branches of useful work. In these vacation schools are taught basketry, benchwork, Venetian iron-work, chair-caning, carpentry, fret-sawing, whittling, work in burned wood and leather, sewing, embroidery, crocheting, millinery and domestic science. Often so much taste and ability are shown in one or another of these directions that a youth or girl finds his or her natural vocation through the vacation school. There are classes in the vacation schools even in the care of the sick, of the accidentally injured and of babies. Already there are indications in city tenement life that the art and culture disseminated by the vacation schools are entering into the lives of the people. Home conditions improve; and it is much, moreover, to give healthy and happy occupation to the youth who would else be subjected to the idle and vicious influences of the streets. In 1902 the schools cost the city $275,000; but the sum was applied to the maintenance of the evening recreation centers and afternoon playgrounds as well as the vacation schools properly so called. The latter essentially are summer institutions which meet for five mornings a week during a term of six weeks. The evening recreation centers, whose work is elsewhere described, are open during all the year. (See PLAYGROUNDS.) The afternoon playgrounds are open for systematic sports during two months of the school vacation. At the back of the movement for vacation schools is the feeling that, in large cities at least, the prolonged summer vacation is not without its mental and moral dangers, springing chiefly from lack of occupation.

The annual reports on vacation schools of New York, Chicago and other cities contain material of value to those interested.

Vaccination (*văk'sĭ-nā'shŭn*) is the process by which the disease termed *vaccinia* or cowpox, from the Latin word *vacca*, a cow, is introduced into the human system to protect it against the attack of the more severe disease of smallpox. In his *Inquiry into the Causes and Effects of the Variolæ Vaccinæ* Jenner, the discoverer of this remarkable remedy, establishes the following facts: (1) That this disease when communicated to man is a sure protection from smallpox; (2) that the cowpox alone, and not other eruptions affecting the cow, which might be confounded with it, has this power of protection; (3) that the cowpox may be communicated at will from the cow to man by the hand of the surgeon; and (4) that the cowpox once ingrafted on the human subject may be transferred from person to person, giving each one the same immunity from smallpox as was enjoyed by the person infected directly from the cow. See JENNER.

Vacuum (*văk'ū-ŭm*), the region in a closed vessel from which the air has been largely removed. To completely remove all gases from a closed vessel is impossible. To obtain a complete vacuum appears therefore to be a hopeless task. With an ordinary air-pump, in good working condition, one may produce a vacuum in which the pressure is not more than two or three millimeters of mercury. But by means of a mercury pump one may easily exhaust a vessel until its pressure is only one-millionth that of the atmosphere. If, however, elaborate precautions are taken with a Sprengel pump, a vacuum of only one hundredmillionth that of the atmosphere may be obtained. See Air-Pump, and read Kimball's *Physical Properties of Gases*, chap. v.

Valdai (*väl-ui'*) **Hills,** a range of hills in western Russia, midway between Petrograd and Moscow, 300 feet in height, but rising in Mount Popovagora to 1,080 feet. They extend about 250 miles; were formerly forested; but now are mostly cleared and cultivated. They form a watershed between the Volga, Dnieper and Düna.

Valen'cia, an ancient city and seaport of Spain and formerly its capital, stands on the shores of the Mediterranean, 300 miles by rail from Madrid. The Huerta, 35 square miles in extent, which surrounds the city, resembles an immense orchard, and is watered by an intricate network of pipes and rivulets laid down by the Moors 800 years ago and answering its purpose down to the present day. There are numerous picture-galleries in the city, in the chief of which only the productions of the great Valencian school are to be seen. There are a museum, a botanical garden and a fine old cathedral. The university, with its library of 50,000 volumes, has 39 professors and 1,728 students. The custom-house, dating from 1758, is now the cigar-factory, which employs more than 3,000 persons and produces 120,000 pounds of tobacco yearly. Valencia is connected with Madrid by rail, and is a famous summer resort of the more prosperous classes. Population 233,348.

Valencia, a town of Venezuela, South America, in the province of Carácas, two miles east of Lake Valencia. The city is situated in an exceedingly fertile district, in which cattle and horses are raised in great numbers. Population 38,654.

Val'entine, Basil, a celebrated German alchemist of whom so little is known that it is even disputed whether he lived in the 12th or in the 13th century. It has been maintained that he was a monk of the order of St. Benedict in St. Peter's convent at Erfurt; but his name does not appear on the Erfurt list nor on the general lists at Rome. His works were mostly written in the old Upper-Saxon dialect, and were not printed until 1602, after which many of them were published in the form of French translations.

Valentine or **Valenti'nus,** presbyter and martyr, according to the Roman legend, was arrested and thrown into chains at the instance of Emperor Claudius about 270 A. D. He was handed over to Calphurnius, who employed one Asterius to win him back to idolatry, but, instead of this, Asterius was won over to the Christian faith on account of the healing of his blind daughter by Valentine. The saint was kept in prison for a long time, but was finally beheaded. The custom of sending valentines is the survival of a practice connected with the worship of Juno on or about Feb. 14, and its association with this saint is purely accidental.

Valentin'ian I, emperor of the Western Roman empire from 364 to 375 A. D. As a military officer under Julian and Jovian he rose to a high position, and on the death of Jovian was chosen emperor by the officers of the army at Nicæa. Soon after this he named his brother Valens as his colleague, and the two brothers divided the empire between them, Valentinian, as emperor of the west, taking Italy, Illyricum, Spain, Britain, Gaul and Africa. During Valentinian's reign there were wars in Africa and Germany, and Rome also came into collision with peoples of whom we now hear for the first time — Burgundians, Saxons and Alemanni. The emperor's headquarters were at Treves during the greater portion of his reign. His general administration was wise and able and, in many respects, beneficent. Although hard and exacting in the collection of taxes from his people, the money was spent in defending and improving his dominions, and not in idle show or luxury. He died of apoplexy in 375, and was succeeded by Gratian and Valentian II, his sons.

Valentinian II, an infant four years of age, and his half-brother Gratian, a lad of 17, became joint emperors of the Western Roman empire in 375 A. D. They made Milan their residence, while the empire was at least nominally divided between them, Valentinian taking Italy and a part of Africa. Gratian died in 383, and four years later Maximus, who had commanded a Roman army in Britain, crossed the Alps into the valley of the Po and threatened Milan. The emperor and his mother Justina fled to Theodosius, emperor of the East, and besought his assistance, and in accordance with their request Theodosius marched into Italy with an army, defeated Maximus, and again set Valentinian on the throne. He was assassinated in 392 A. D.

Valentinian III, grandson of Theodosius the Great, was declared Emperor of the West in 425 A.D. His reign of 30 years was a period of great and terrible events, associated with the names of Attila, Genseric and Ætius, "the last of the Romans." Valentinian's usual residence was at Ravenna; but he fled to Rome in 452 on the approach of Attila, who, after ravaging Italy, died in the following year. In 454 Ætius, who had won the great victory over Attila at Chalons in 451, and who alone could have saved Rome from the destruction which hung over her, was treacherously murdered by Valentinian; and the next year the crime was avenged by the murder of the emperor himself while he was viewing some games in the Campus Martius. With the death of Valentinian the family of Theodosius became extinct.

Valentinus was the most important Christian theologian before Origen. He sought to combine the results of Greek philosophy with the doctrines of the Gospel, and treated the manifestation of Jesus as the keystone in the structure of thought which Greek science had reared. He may be regarded as superior to Philo in many respects and as having surpassed Origen in delicacy of perception and vigor of style, although he was far behind him in the extent of his learning. He came to Rome from Egypt about 138 A. D., and died about 160.

Valet′ta, an important fortress and beautiful city, capital of the island of Malta. The city was founded by John Parisot de la Valette, who so gallantly defended the island of Malta against the Turkish fleet in 1565. Alone and unsupported by any of the Christian powers, La Valette held the island under circumstances of great difficulty and distress; and at the end of four months the Turks were compelled to withdraw, after suffering a loss of several thousand men. The city contains many relics of the occupation by the Knights of Malta. Population 60,000. See MALTA.

Valhalla (*văl-hăl′lȧ*), in Scandinavian mythology, the "hall of the slain" — the abode of Odin in Asgard, the palace of Immortality, inhabited by the souls of heroes slain in battle. In the old Norse or Viking era, the *Eddas* relate, Odin and his chiefs dwelt in a sort of Olympus (Asgard) — the Norse Pantheon — which had two mansions, Gladsheim for the gods and Vingolf for the goddesses. There also was Walhalla, wherein Odin placed one half of the heroes slain in battle, the other half being received by Freja. the wife of Odin, who presided over smiling nature, sending sunshine, rain and harvest. The roof of Valhalla was resplendent with gold; spears, shields and armor adorned its walls. Out of this abode rode forth Valkyrs (or choosers of the slain) on invisible horses, to the battles of men on earth, and with their spears pointed out the heroes who should fall, whom they caught as they fell and bore to Valhalla in their arms. Troops of these invisible horsemen issued daily to engage in combat and return at night to be entertained with the never-ending hospitality of Odin. See the Norse prose *Edda*. Figuratively, Valhalla (or Walhalla) has come to mean a hall or temple adorned with statues and memorials of a nation's great ones, especially its soldier heroes.

Val′jean′, Jean, the hero of *Les Miserables*, one of the best known and loved of the romances of Victor Hugo, is a former galley-slave whose life becomes changed through the goodness and kindness of a bishop. The bishop entertains Valjean, who escapes with the precious candlesticks of his host! Valjean is captured and brought back; but the bishop declares he has given him the candlesticks, and makes him a convert. Hereafter, Jean Valjean becomes the guardian of a beautiful girl, Cosette, to whom he devotes his life. The story of Jean Valjean is that love begets love and works miracles. "His whole heart melted in gratitude, and he loved more and more."

Valladolid (*văl′yȧ-thō̍-lĕ̍th′*), a famous city of Spain, at one time capital of the whole country and still capital of the province of Valladolid, stands on the left bank of the Pisuerga, 150 miles northwest of Madrid by railway. It is 2,000 feet above the level of the sea, and has a healthful climate, the air being pure and genial and the sky generally cloudless. As Valladolid was the residence of the court prior to its removal to Madrid in the 16th century, it contains many large and decayed dwellings, although many new mansions have been erected and the streets have been paved enlarged and multiplied. There are a noted university, founded in 1346, a palace and an unfinished cathedral. Here Ferdinand and Isabella were married and here Columbus died. The city communicates with the Atlantic Ocean by the Douro and with various portions of Spain by canal and railway. Population 68,789.

Valladolid, a town of Mexico, in the state of Yucatan, 90 miles southeast of Merida, stands in the midst of a highly cultivated tract of country. It is the best-constructed and healthiest town in Yucatan, and is the seat of cotton manufactures. Population 14,000.

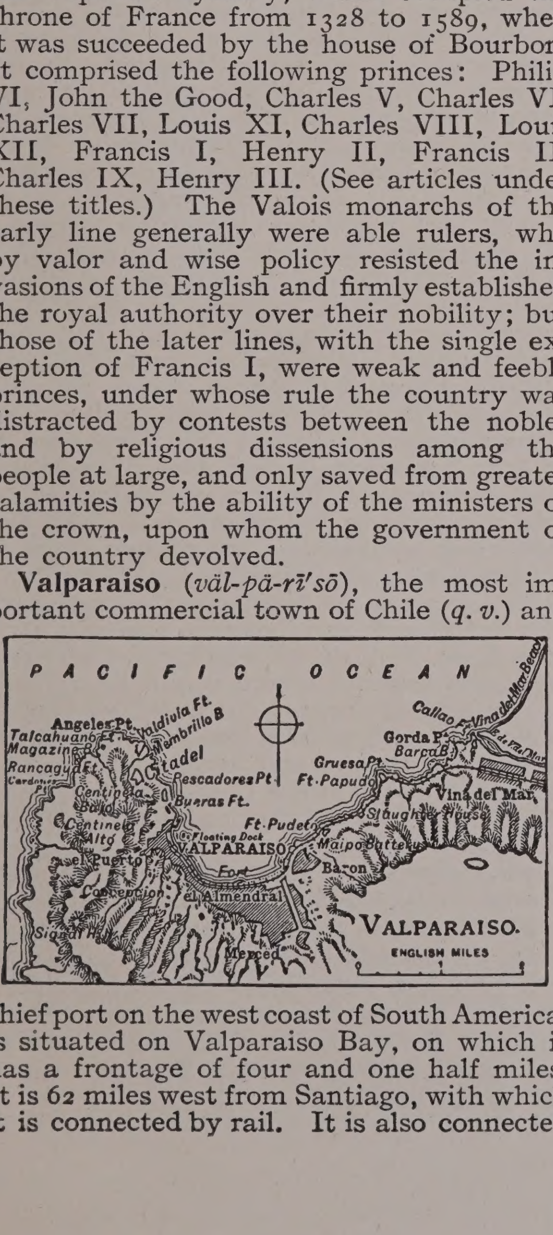
Vallejo (*vȧl-yā′hō̍*) **Cal.,** a city in Solano County, at the mouth of Napa River, which empties into the northeast part of San Pablo Bay. Vallejo is connected by steamship lines with San Francisco (30 miles to the southwest); it is also reached by the Southern Pacific Railroad and an electric line. Adjacent to both is the Mare Island Navy-Yard (U. S.), which gives employment to about 2,500 men. There is also a quicksilver mine in the vicinity, while the region is a fertile one for farming and fruit-growing. In addition to lumber yards, planing-mills and fish-packing establishments, it has flour-mills, brick yards, a tannery, bottling works, a cement-works and carbonated water factories. It has a Sailor's Club house, a Home for Orphans, a Carnegie Library and the St. Vincent's Convent and school. Founded in 1851, the city was designed at one time as the capital of the state and here for a couple of years (1851-3) were held the annual sessions of the state legislature. Population. 20,000.

Valley Forge, Pa., a small village on the Schuylkill River, Chester County, 24 miles west of Philadelphia. The American army of about 11,000 encamped there on December 17, 1777, after the battles of Brandy-wine and Germantown. The place was chosen partly for its defensibility and partly to protect Congress, then in session at York, Pa. Many of the men died from exposure because of inadequate supplies. Here Baron Steuben disciplined and reorganized the army. From this camp Washington reoccupied Philadelphia in June of 1778. In 1893 Pennsylvania appropriated $25,000 towards making Valley Forge a state park, but the project was dropped because of the inadequacy of the fund.

Vallombro'sa, a celebrated abbey of Tuscany, situated among the Apennines in a valley surrounded with forests of fir, beech and chestnut trees. Here an Order of Benedictine monks was founded about the middle of the 11th century, who were called Vallombrosians from the name of the site. This monastery was suppressed in 1863, and its buildings used for a royal academy of forestry, but it is still much visited by artists and tourists.

Valois (*vål'wä'*), **House of,** a branch of the Capetian dynasty, which occupied the throne of France from 1328 to 1589, when it was succeeded by the house of Bourbon. It comprised the following princes: Philip VI, John the Good, Charles V, Charles VI, Charles VII, Louis XI, Charles VIII, Louis XII, Francis I, Henry II, Francis II, Charles IX, Henry III. (See articles under these titles.) The Valois monarchs of the early line generally were able rulers, who by valor and wise policy resisted the invasions of the English and firmly established the royal authority over their nobility; but those of the later lines, with the single exception of Francis I, were weak and feeble princes, under whose rule the country was distracted by contests between the nobles and by religious dissensions among the people at large, and only saved from greater calamities by the ability of the ministers of the crown, upon whom the government of the country devolved.

Valparaiso (*väl-pä-rī'sō*), the most important commercial town of Chile (*q. v.*) and chief port on the west coast of South America, is situated on Valparaiso Bay, on which it has a frontage of four and one half miles. It is 62 miles west from Santiago, with which it is connected by rail. It is also connected with the Transandine Railway, which will give connection with Buenos Ayres, Argentine Republic. Steamship lines connect the city directly with Europe and with Panama. Except for a narrow, level strip along the bay, the site consists of a series of hills from 300 to 1,000 feet in height. The city has handsome government buildings, fine hotel, office and business buildings, extensive wharves and warehouses, 12 parks, ten newspapers, professional and high schools, primary schools and extensive manufacturing establishments of various kinds. Valparaiso has been visited by destructive earthquakes at various times. The latest occurred in August, 1906, when the city was devastated, involving an appalling loss of life and a property loss estimated at $200,000,000. Population 270,000.

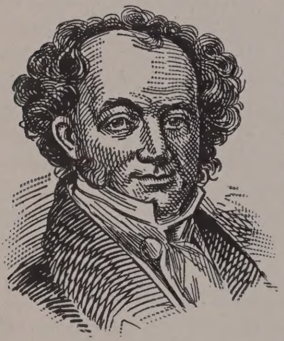


Valparaiso, Ind., county-seat of Porter County, 44 miles southeast of Chicago, Ill., is on the Fort Wayne, Grand Trunk and "Nickel Plate" railroads. It is in a fertile farming district, and trades largely in agricultural productions. The chief manufactures consist of dairy-products, machine-shop goods and mica-paint. The town has been made well-known by Northern Indiana Normal School. This was founded in 1874 by Henry Brown for those who can not avail themselves of courses in regular colleges. It has over 5,000 students of both sexes, who obtain board, lodging and higher education for about $125 a year. The secret of the low prices lies in the elimination of the middleman and the purchase of food in enormous quantities at wholesale rates. The college has seven acres of gardens cultivated mainly by the students, and these are housed almost as economically as they are fed. For 22 cents a day students obtain good lodging and excellent meals. From the profits on board, lodging and teaching this school has acquired 50 acres of land, bought or built nine substantial buildings, earned and saved nearly $1,000,000 and formed a faculty of 162 instructors. Common-sense ideas are put to use in the educational work. The institution has $200,000 of productive funds, and in 1907 its income was $295,000. There is a library of 12,000 volumes. The population of the city is 6,987.

Vam'béry, Arminius, a distinguished Hungarian traveler and professor of Oriental languages at Budapest, was born in 1832. He has traveled widely in Persia and Central Asia, and published many works narrating his wanderings in Persia, in India, in Bokhara and in Central Asia. His more notable works are *History of Bokhara*, *The Central Asian Question*, *Story of Hungary*, *The Coming Struggle for India* and *Western Culture in Eastern Lands*.

Vam'pire, according to a superstitious belief, which still prevails in some European countries, a ghost which comes out of the grave at night and sucks the blood of men and women. In the mythology of the ancient Greeks beings of a similar nature existed, called the Lamias. These were beautiful women who allured youths to their embrace in order to feed on their flesh and blood. During the middle ages there was a prevailing belief that all persons who died under the ban of the church were sent forth by the devil at night to destroy other people; and it was thought that the only way to escape these vampires was by digging up their unwashed corpses and burying them.

Van, a fortified town and province of Turkey in Asia, stands near the southeast shore of Lake Van, 140 miles from Erzrum. It is overlooked by a citadel now much dilapidated, but which from its lofty height could easily be rendered almost impregnable. The principal public buildings, in addition to the citadel, are the mosques, the Armenian churches, the caravansaries and the bazaars. Van contains numerous ancient ruins, and cuneal inscriptions are found in which the name of Xerxes frequently occurs. Population 30,000. Lake Van is an inland sea, 80 miles in length and 50 miles in extreme breadth. It is fed by about eight streams, and has no visible outlet. Its waters are salt, and the only fish caught are a kind of sardines, which are salted and exported throughout Asia Minor.



MARTIN VAN BUREN

Van Bu'ren, Martin, eighth president of the United States, was born at Kinderhook, N. Y., Dec. 5, 1782. He commenced the practice of law at a very early age, and was elected to the New York state senate in 1812. After filling a number of other offices and taking an active part in the politics of the state, in 1821 he was chosen United States senator. He served a term of six years in that capacity, and was then chosen governor of New York. When General Jackson became president in 1829, Mr. Van Buren was appointed secretary of state, but he resigned the office in 1831 in order to accept the position of minister to England. This appointment being made during the recess of Congress, Mr. Van Buren proceeded to England, but as the senate refused to confirm the appointment he returned home soon after. This rejection by the senate probably caused his nomination and election to the office of vice-president in 1832, General Jackson being re-elected president at the same time. In 1836 he was elected president of the United States, receiving 170 electoral votes out of 283; but, although nominated for a second term by his party in 1840, he was overwhelmingly defeated by Gen. William Henry Harrison, the electoral vote standing for Harrison, 234; Van Buren, 60. Mr. Van Buren was brought before the Democratic national convention of 1844 as a candidate, but his nomination was prevented by the adoption of the rule requiring a vote of two thirds of the delegates to secure a nomination. In 1848 he was the candidate of the Free Soil party, but received no electoral votes. He died at Kinderhook, July 24, 1862.

Vancou'ver, Can., the largest city in British Columbia. It was founded by James Douglas in 1843. It is situated on Burrard Inlet, and is one of the best deep-water harbors on the Pacific coast. It is the western terminus of the Canadian Pacific Railway, also a terminus of the Seattle and Vancouver branch of the Great Northern Railway. Its population is about **175,000** and is rapidly increasing. Steamers for all ports, China, Japan etc., regularly leave Vancouver. Vancouver is destined to be a large city. It is a gateway of world-wide commerce. The first Canadian Pacific Railway steamer arrived at Vancouver from Yokohama in 1887. The surveys of the Canadian Pacific Railway which made Vancouver accessible were begun in 1871. A visitor to Vancouver, noticing wide streets and handsome structures, a score of chartered banks, with vessels from many lands in the harbor and business active everywhere, wonders at the change wrought in a single generation.

Vancouver Island, not the least important portion of British Columbia, which, from its great wealth of natural resources and its commanding position on the Pacific coast, is fast becoming one of the richest and most prosperous districts of the province. Coal-mining and lumbering are the chief industries, and fishing, quartz-mining, copper-smelting, ship-building, whaling and other branches are being rapidly developed. The Esquimault and Nanaimo Railway, running from Victoria to Wellington, serves a section of country which it will be difficult to surpass anywhere in the world for beauty of scenery and natural wealth. There are prosperous agricultural communities along the railway and in the Comox District, and several mines are being developed. There is quite a large area of agricultural land, which, where the thick forests have been cleared away, produces cereals of all kinds in abundance, as well as fruits. The climate, owing to the effect of the warm Japan Current (*q. v.*), is remarkably mild. The heaviest rains fall on the north and west coasts, owing to the combined effect of this current and the prevailing winds. The coal mines are on the east coast.

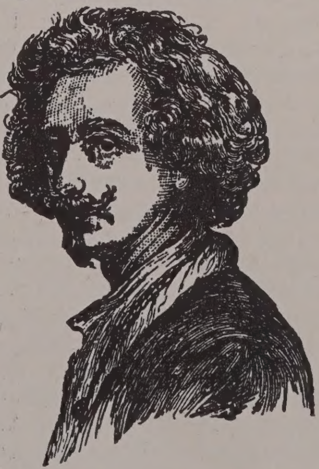
Vandals, a race of European barbarians who contributed very largely to the overthrow of the Roman empire. They made their first appearance as an historic people in the 2d century A. D., and in the first part of the 5th century, in company with the Suevi, Alani and other German tribes, invaded Gaul and ravaged and wasted it for three or more years. In 429 they crossed the Strait of Gibraltar, 50,000 to 80,000 strong under their leader Genseric, and carried devastation and ruin over northern Africa from the shores of the Atlantic to the frontiers of Cyrene. In 439 Genseric broke the peace which he had concluded with Valentinian III and conquered Carthage, when a new peace was concluded which recognized the authority of the Vandals over northern Africa and also over Sardinia, Corsica and part of Italy. In 455 the Vandals captured Rome and plundered it for several days. The manner in which they mutilated and destroyed the works of art collected in the city has caused the term vandalism to be applied to all similar acts of barbarity. After the death of Genseric his son, Hunneric, cruelly persecuted the orthodox Christians and kept the Mediterranean in almost constant alarm by his piracies. The Vandals continued to occupy northern Africa until 533, when the emperor, Justinian, sent an expedition against them under the great general, Belisarius, with the result that they were completely conquered, and their chieftain, Gelimer, was captured and carried to Constantinople in triumph. Most of the Vandals were then drafted into the Roman army and "used up" in the wars with Persia, the few who remained in Africa rapidly disappearing among the natives.

Van'derbilt, Cornelius (commonly called Commodore Vanderbilt), was born on Staten Island, N. Y., May 27, 1794. At the early age of 16 he showed signs of his genius and enterprise by running a boat of his own between New York and the island, and at 23 had accumulated nearly $10,000. In the year 1817 he associated himself with Thomas Gibbons in running the first steamer between New York and New Brunswick, N. J., serving as captain for several years. In 1829 he withdrew from the management of Gibbons' steamers, and for more than 20 years afterward built and operated steamers of his own from New York to various points, all of which proved very profitable. In 1851 he established a line from New York to San Francisco, which he sold to a company of which he himself became president two years later. During the Civil War he presented the government with his finest steamship, *The Vanderbilt*, which cost nearly $1,000,000, and about the close of the war withdrew his capital — amounting to many millions — from steamships and invested it in the stock of various railroads. He soon had control of the New York Central, the Harlem, the Erie and other roads, all of which he conducted with consummate ability and made more and more profitable. In 1873 he gave $1,000,000 to the endowment of Vanderbilt University at Nashville, Tenn., for the education of southern youth. He died at his home in New York, Jan. 4, 1877, having bequeathed the bulk of his estate to his son, William H. Vanderbilt.

Vanderbilt University, a coëducational institution founded in 1872 at Nashville, Tenn., as a Methodist college. The university received its present name in the following year, in honor of Cornelius Vanderbilt's gift of a million dollars to it, since supplemented by other monetary donations from members of the Vanderbilt family and by contributions from the Nashville citizens. In 1912, Andrew Carnegie gave one million dollars for the School of Medicine. It has a fine equipment in buildings, laboratories, etc., besides college-grounds 75 acres in extent. The university prepares for the bachelor's degree in arts, divinity, law, engineering and science; for the M. A. degree in arts, science and pharmacy; and for the doctor's degree in medicine and dental surgery; besides courses with degrees in civil, mechanical engineering. Its teaching staff, with the faculty, numbers 125; while in 1915 it had an attendance of 960 students. It is one of the best of the southern universities.

Vanderlyn (*văn'dẽr-lĭn*), **John,** an American painter, was born at Kingston, N. Y., Oct. 15, 1776, and, after taking lessons in painting from Gilbert Stuart, visited Paris at the age of 20 and studied his art in that city for a number of years. He returned home in 1801, but in 1803 made another journey to Europe, where he remained till 1815. Among his works executed while in Europe were *The Murder of Jane McCrea by the Indians* and *Marius sitting among the Ruins of Carthage*. His *Landing of Columbus* can be seen in the rotunda of the national capitol, and his portrait of *Washington* in the hall of the house of representatives. He died at Kingston, N. Y., Sept. 23, 1852.

Van Die'men's Land. See TASMAN'IA.


SIR ANTHONY VAN DYKE

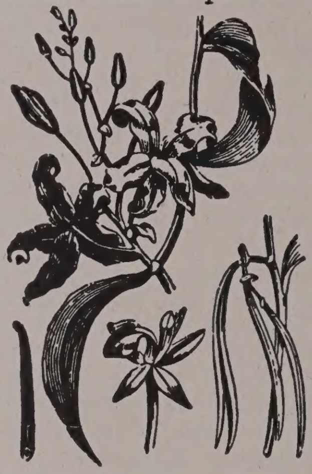
Van Dyke or **Van Dyck, Sir Anthony,** was born at Antwerp, March 22, 1599. It is said that his talent for painting was fostered by his mother, who painted landscapes and was highly skilled in embroidery. After making considerable progress under Van Balen, he became a pupil of Rubens at the age of 16, who was not slow to discover his remarkable genius. In 1621, by advice of Rubens he visited Italy, remaining there five years. In 1632 he came to England on the invitation of the earl of Arundel, where a pension of $1,000 a year was settled on him. He died at London in 1641, leaving property to the amount of $100,000. It was only 20 years from the time when Van Dyke left the studio of Rubens until his death; and in that short period nearly 1,000 pictures of various kinds were executed by him. His best known works are representations of the crucifixion.

Van Dyke, Henry Jackson, D.D., LL.D., American author and preacher, was born at Germantown, Pa., Nov. 10, 1852, and graduated at the Brooklyn Polytechnic Institution, and Princeton College and Theological Seminary. After taking a post-graduate course at Berlin University, he entered the ministry and held the charges successively of the United Congregational church at Newport, R. I., and of the Brick Presbyterian church, New York. The latter charge he resigned in 1899, to accept the Murray chair of English literature at Princeton University. In 1889 he was appointed preacher to Harvard University, and in 1893 delivered the Lyman Beecher lectures on preaching at Yale. He also delivered a memorial ode at the 150th anniversary of Princeton University, of which he is a trustee. He has been a contributor to many of the contemporary magazines, and taken active part in religious work among the colleges. His writings embrace *The Poetry of Tennyson, The Reality of Religion, The Story of the Psalms, The Christ-Child in Art, The Gospel for an Age of Doubt, Straight Sermons to Young Men, The Ruling Passion* and *The School of Life.*

Van Hise, Charles Richard, American geologist and author, was born at Fulton, Wis., on May 29, 1857. He studied at the University of Wisconsin, and in 1879 graduated, after which he became a member of the faculty, acting first as instructor in chemistry and metallurgy, then as professor of metallurgy and petrology, and finally was elected president of the institution. While acting in the latter capacity, he accepted the post of non-resident professor of structural geology in the University of Chicago, and later served as assistant on the Wisconsin State geological survey and subsequently became consulting geologist to the survey. He was also a member of the United States Geological Survey, and took charge, in 1888, of its operations in the Lake Superior district. Two years later he was appointed geologist in charge of the division of the archæan and metamorphic rocks of the United States. He has been made honorary member of a number of foreign scientific societies. During the European War he prepared a two-volume course of study on food conservation issued by the government. His published works embrace *Principles of North American Pre-Cambrian Geology, Some Principles Controlling the Deposition of Ores, A Treatise on Metamorphism* and *Concentration and Control,* dealing with trusts. He died Nov. 19, 1918.

Van Horne, Sir Wm. Cornelius, K. C. M. G., president of the Canadian Pacific Railroad since 1888, was born in Will County, Ill., Feb. 3, 1843, and entered railway service in 1857. After filling various junior posts, he rose to be general superintendent of the Chicago and Alton and subsequently of the Chicago, Milwaukee and St. Paul Railroad. In 1884 he became general manager of the Canadian Pacific Railroad, and in 1888 was elected to the presidency. He was knighted in 1894. He died Sept. 11, 1915.

Vanil'la, the generic as well as the common name of plants which yield the aromatic extract of commerce. The genus is a member of the orchid family, and is native to Mexico and Brazil, and is cultivated in various tropical countries. The aromatic extract is obtained from the long pods, known as vanilla beans, and their seeds.


VANILLA

Van Rensselaer (*văn rĕn' se-lẽr*), **Mrs. Martha,** home economist; born at Randolph, N.Y. She has been professor and head of the department of home economics at Cornell University since 1911. She was a member of the executive staff of the United States Food Administration, 1918-19, and President of American Home Economics Association in 1915-16.

Van Rensselaer, Stephen, American statesman, born at New York, Nov. 1, 1765; educated at Princeton and Harvard. In 1795 he was elected to the New York legislature, afterwards becoming lieutenant-governor and canal commissioner. At the beginning of the War of 1812 he commanded the state militia, leading the assault on Queenstown; but the refusal of a portion of his troops to cross the Niagara River enabled the British to repel the attack, and he retired from the service in disgust. At his own cost he employed professors Eaton and Hitchcock to make geological surveys in New York and New England. In 1824 he established an institution at Troy for the education of teachers, with free pupils from every county of the state. About this time also he entered the lower house of Congress, and served several terms in that body with honor and distinction. He died at Albany, N. Y., Jan. 26, 1839.

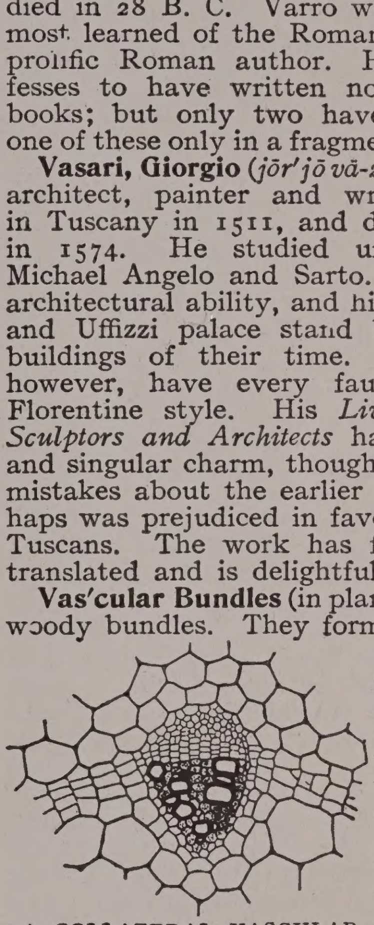
Vane, Sir Henry, was born at London in 1612, and was educated at Oxford, where he appears to have embraced the republican principles for which he became so famous. His travels in France and Switzerland strongly confirmed him in his opposition to the Church of England; and in 1635 he sailed for New England — the refuge of freedom-loving spirits in those days. He was chosen governor of Massachusetts, but his supposed heretical opinions soon destroyed his popularity among the Puritan settlers, and after a residence of a year or two in the new colony he returned home and entered upon a political career. When the war between Charles I and Parliament broke out, no man was more active among the leaders of Parliament than Vane. In 1646 Vane was one of the English commissioners for the preservation of peace with Scotland, and in 1648 was appointed to negotiate with Charles I at the Isle of Wight. But he did not view with satisfaction the increasing power of Cromwell and the army, and was strongly opposed to the execution of the king. His views as to the rights and powers of Parliament brought him into pretty sharp conflict with Cromwell, who is said to have exclaimed, when he dissolved his Parliament in 1653: "The Lord deliver me from Sir Harry Vane!" When the restoration of Charles II took place, Vane was one of the 20 persons exempted from the act of general amnesty; and in July, 1660, he was arrested and committed to the Tower. Two years later he was brought to trial at London, and, although he defended himself with great ability and eloquence he was found guilty and condemned to death. In response to a petition that Vane's life should be spared, Charles wrote to Clarendon, declaring that he is "too dangerous a man to let live, if we can honestly put him out of the way." He was accordingly beheaded on June 14, 1662.

Var′nish, a solution of some resinous material in any proper solvent, alcohol and oils being the ones chiefly employed. The solution must be of such a consistency as to be thinly and smoothly spread over the surface intended to be varnished, so that, when it dries, it will leave a thin, resinous coating, which is either glossy or can be made so by mechanical polishing.

Var′ro, Mar′cus Terentius, "the most learned of the Romans," was born at the Sabine town of Reate in 116 B. C., and received his education first under Præconinus and then under Antiochus, a philosopher of the Academy. He served with distinction against Mithradates, king of Pontus, and also against the Mediterranean pirates, but afterwards, as legate of Pompey in Spain, he was compelled to surrender his forces to Julius Cæsar. He continued to share the fortunes of Pompey till after his defeat at Pharsalia, when he was pardoned by Cæsar and employed by him to collect and arrange the great library designed for the public. When the second triumvirate was formed by Antony, Lepidus and Octavian, his name was on the list of the proscribed, but, after some time spent in concealment, he was received under the protection of Octavian, and the remainder of his life was spent in the prosecution of his studies. He died in 28 B. C. Varro was not only the most learned of the Romans, but the most prolific Roman author. He himself confesses to have written no less than 490 books; but only two have survived, and one of these only in a fragmentary state

Vasari, Giorgio (*jōr′jō vă-zä′rē̂*), an Italian architect, painter and writer, was born in Tuscany in 1511, and died at Florence in 1574. He studied under Signorelli, Michael Angelo and Sarto. He had great architectural ability, and his Arezzo church and Uffizzi palace stand beside the best buildings of their time. His paintings, however, have every fault of the late Florentine style. His *Lives of Painters, Sculptors and Architects* have great value and singular charm, though he made many mistakes about the earlier artists and perhaps was prejudiced in favor of his fellow-Tuscans. The work has frequently been translated and is delightful reading.

Vas′cular Bundles (in plants), often called woody bundles. They form the great conducting systems of fern-plants and seed-plants, by means of which water with whatever it contains in solution passes from the roots which absorb it to the leaves which use it; and by which elaborated materials pass to points of use and storage. The movement of water from roots to leaves is commonly spoken of as the ascent of sap (but see Water, Ascent of). This great conducting system, composed of vascular bundles, is found only in fern-plants and seed-plants, which are often called vascular plants to distinguish them from moss-plants and thallus-plants, which do not possess vascular bundles. Each bundle consists of two distinct regions: (1) xylem or wood, that which contains the tracheæ or tracheids (see both); and (2) phloem or bast, that which contains the sieve-vessels (*q. v.*). The xylem is concerned in the water conduction and the phloem in food conduction. In an ordinary tree the whole wood-mass is an aggregate of xylem tissue, while the



A COLLATERAL VASCULAR BUNDLE

fibrous inner bark is the phloem tissue (see Bark). Different types of bundles are distinguished by the arrangement of their xylem and phloem masses with reference to one another. Those bundles, in which the xylem and phloem lie side by side on the same radius, the phloem always being on the outside, are called collateral bundles, and are characteristic of the stems of seed-plants. Those in which the xylem is completely surrounded by the phloem are concentric bundles, and are characteristic of the stems of fern-plants. Those in which the xylem and phloem alternate with each other around a common center are radial bundles and are characteristic of all roots.

Vases form a very ancient class of vessels, used formerly for domestic purposes but now chiefly for ornamentation. Usually they are circular in shape, have one or two handles, and are hollow within, and variously decorated without. In architecture, however, vases need not be hollow. The ancient Greek vases found in catacombs throughout Sicily, southern Italy and Greece were used to receive the ashes of the dead. Such vases are usually of pottery, though some have been found of metal, ivory and bronze. The study of ancient terra-cotta vases has shed a great deal of light upon Greek and Roman life; but unfortunately the Egyptian vases are upon the whole of little interest, perhaps because good clay was so abundant in Egypt that it cheapened the art of pottery. The oldest Greek vases are marked by geometrical patterns. At a later stage plants and animals are used in decoration. A finer clay and a more lustrous pigment indicate the progress of the art. The greatest masters of pottery were the Athenians, who in the 6th century B. C. invented a brilliant black glaze, used for figures upon a red ground. At a later stage the Athenians frequently depicted red figures upon a black ground. A period of decadence in the potter's art appears to have begun in Athens as early as the fourth century B. C. The vases of Sicily and southern Italy were more gay and less classic than those of Athens.

Among the Greek vases the type best known perhaps is the *amphora*, in which oil and wine were kept. The *pithos* was a large and comparatively coarse vase for grain or the cheaper fluids. The *hydra* was a water-pitcher which possessed an extra handle for pouring. The *crater* was a bowl from which wine was served to the company at table. The *cylix* is a very shallow, broad cup. The figures upon these and other Græco-Roman vases reveal to the modern observer scenes from the myths, the industries the festivals, the ceremonies and the sports of ancient life. The Portland (*q. v.*) vase in the British Museum is one of the most famous examples. The workmanship of this vase is peculiar, for it is constructed of two layers of glass, of which the outer and opaque layer is cut down in such a way that figures are left standing, cameo-fashion, upon the inner layer as a ground. See Pottery.

Vas'sar College, founded by Matthew Vassar, the first well-equipped institution for the higher education of women, is two miles east of Poughkeepsie, N. Y. It was incorporated in 1861 and opened in 1865. In the same year Mr. Vassar transferred to the trustees a farm of 200 acres, on which the college was to be built, and other property, the whole amounting to $400,000 in value. He increased this sum by other large gifts during his lifetime, and on his death bequeathed $400,000 more. It has also been pecuniarily aided by Mr. Vassar's nephews In accordance with the wish of Mr. Vassar some of the instructors are men and some are women. The buildings are the main building, modeled after the Tuileries, observatory, laboratory, museum, conservatory, gate-lodge, gas-works, boiler and pump houses and farm-buildings. The library contains 60,000 volumes, and the gymnasium, observatory and laboratory are finely equipped, while the conservatory was added for assistance in the study of botany. It has also a collection of paintings and casts of models. There are 210 acres in the grounds, forming a beautiful park, with a lake for boating and skating. Besides the regular course for the degree of A. B., admission to which requires the same examinations as entrance to the leading colleges, there are schools of painting and music. In 1910 there were 104 instructors and 1,058 students; and the college is steadily growing in size and in influence. To-day its annual income is close upon $490,000; while the amount of its productive funds is $1,312,600. The value of its chief buildings and residences at present exceeds two million dollars. The college offers its students four fellowships, six or seven graduate scholarships, besides a number of undergraduate scholarships.

Vassar, Matthew, American philanthropist and founder of Vassar College, was born in Norfolk County, England, April 29, 1792, and four years later accompanied his father to America, where he settled on a farm near Poughkeepsie, N. Y., his father establishing a brewery in that city. Young Vassar subsequently succeeding his father in this interest, he decided in 1845 to apply a portion of the profits derived from it to the endowment of a school for the higher education of women. This purpose he put into effect in 1861, by donating $400,000 to the institution in Poughkeepsie that became known as Vassar College. The success of the institution was gratifying and immediate. On Matthew Vassar's death in June, 1868, he provided in his will for a further donation of $400,000 to Vassar. The institution has been since enriched by large sums donated to it by the nephews of Matthew Vassar, and to the endowing of memorial chairs, aiding the Literary and Scientific institute attached to the college, to Vassar Brothers' Hospital and to the Home for Aged Men in Poughkeepsie.

Vatican (*văt'ĭ-kăn*), the residence of the Pope of the Roman Catholic Church, and the seat of the great library, museums and collections of art, ancient and modern, which constitute one of the chief attractions of Rome for all visitors. Although the earlier popes had a residence in the Vatican, it is probable that no part of the present edifice is older than the pontificate of Nicholas V, who in the fifteenth century began the plan of improvement and embellishment of the Vatican which has made it the noblest of princely residences. Alexander VI, Julius II and, above all, Leo X, pursued the same plan. Nearly all the succeeding popes have had some share in the enlarging of the building. Amid all the difficulties, financial and political, of his pontificate Pius IX made numerous improvements to the palace, the most striking being the great stair by which it is approached from the collonade of St. Peter's. The building with its garden and appurtenances is said to cover a space equal to the whole area of the city of Turin, such as it was thirty years ago, with its 130,000 inhabitants. It contains, several thousand separate rooms or apartments, some of them of unrivalled beauty and elegance. Outstanding among these are the chapel of San Lorenzo, the Pauline chapel, the Sistine chapel, decorated in frescoes from the brush of Michael Angelo, the galleries and halls decorated by Raphael, Giulio Romano and their scholars, the magnificent library, the galleries of antiquities, Christian and pagan, and of paintings, statuary, bronzes, medals, vases and other objects of art.

Vatican City, the State of (CITTÀ DEL VATICANO), the territory of the See and Church of Rome, is situated in Rome, Italy. It includes St. Peter's, the Vatican Palace and Museum, the Vatican gardens, and neighboring buildings between Viale Vaticano and the Church. Its territory was purposely limited in 1929 by treaty to include only 108.7 acres, as an indication that the motive of the Holy See was only a guarantee of independence and not of political prestige. Thirteen other buildings in Rome, outside the exact boundaries, enjoy extra-territorial rights and include those buildings which house the officers necessary for the administration of the Holy See.

A double track railway, 600 feet long, extends from a station in the Vatican gardens to a junction with the Italian State railway, just behind St. Peter's. It was opened formally in March, 1933, for the Pope's private train of three coaches. The papal throne is carried in one coach; another is outfitted as a chapel, and the third is the Pope's dining and sleeping car. Guglielmo Marconi presented to the Holy Father on February 13, 1931, the new Vatican City radio station HVJ in celebration of the ninth anniversary of his enthronement. Pope Pius XI opened the station formally with a world-wide broadcast on peace. It was delivered in Latin but translated into many languages. This station connects the Supreme Pontiff with papal nuncios all over the world.

The legal system of Vatican City is based on canon law and the pontifical constitutions and rules. The Italian law of Rome applies for cases not expressly covered. The Supreme Pontiff governs Vatican City, with the assistance of the various Sacred Congregations, offices and tribunals of the Roman Curia or Papal Court. On January 13, 1933, Pius XI placed the civil government of Vatican City in the charge of a Commission of four. His nephew, Count Franco Ratti, heads this Commission, and the other three members are in charge of the departments of Art, Administration and Technical Service. The State flag is white and yellow, charged with the crossed keys and the triple tiara. In December, 1930, after a lapse of sixty years, the issue of Papal coinage was resumed. A complete coinage was struck in 1931. There are eight of the new coins, which have the same fineness and value as the corresponding Italian coins. Two are of bronze, two of nickel, three of silver, and one is of gold. The Vatican City and Italian Government have made an agreement to remain in force for ten years, that the currency of each state shall circulate in the territory of the other. The Vatican City has pledged to issue coins not to exceed 1,000,000 lire in total value in any one year. The city has its own postal facilities and issues its own postage stamps.

With comparatively slight intermissions, the Popes held temporal power over the so-called Papal States for many centuries. This territory stretched across central Italy from sea to sea, and comprised an area of 16,000 square miles, with a nineteenth century population of approximately 3,125,000. During the reign of Pius IX this entire territory was incorporated in the kingdom of Italy. The sovereignty of the Pope was confined to the palaces of the Vatican and the Lateran in Rome, and the villa of Castel Gandolfo, by a law of May 13, 1871. This law further guaranteed to the Pope and his successors forever, a yearly income of 3,225,000 lire. This allowance remained unclaimed and unpaid until the final settlement in 1929.

Negotiations between the Holy See and the Italian government were begun on October 4, 1926. On February 11, 1929, Cardinal Gasparri and Premier Mussolini signed the Treaty of Conciliation, the Concordat and the financial convention, at the Lateran Palace. The political treaty recognized the full and independent sovereignty of the Holy See in Vatican City. The Concordat regulated the condition of religion and of the Church of Italy. The financial settlement granted to the Holy See the sum of 750,000,000 lire in cash and 1,000,000,000 lire in Italian five per cent State bonds, as a definite and final settlement of all financial claims of the Holy See against Italy for the loss of temporal power in 1870. The treaties were ratified by the Pope and the Italian Parliament on May 14, 1929, and May 15 respectively, and signed by the King on May 27. On June 7, 1929, they became effective when the ratifications were exchanged at the Vatican and the cash payment made.

On April 1, 1933, the Pope formally inaugurated the Holy Year, by opening the Sacred Door of St. Peter's and entering the church alone.

Castel Gandolfo, the papal residence in the villa overlooking Lake Albano, fifteen miles from Rome, was put into order, the work of restoration and remodelling requiring two years. A model farm is maintained there. The Pope took up his residence at Castel Gandolfo during the most intense heat of the summer of 1934. This was the first time for about sixty years that the Supreme Pontiff had resided anywhere but at the Vatican during his pontificate.

The population of Vatican City on December 31, 1932, was 1,025. Of this population, 853 were Italians, 578 men, and 275 women; and 121 Swiss, four of whom were women.

See ROMAN CATHOLIC CHURCH.

Vatican, Council of the, the great ecumenical council of the Roman Catholic church which convened in 1869-70, at which the doctrine of papal infallibility was formally promulgated. This council, composed of Roman Catholic prelates—some 750 in number—from all parts of the world, convened in the Vatican palace on December 8, 1869, and closed its deliberations on October 20, 1870, when this dogma was adopted by a practically unanimous vote. As formulated at the council, it contains the following propositions: (1) That a proper primacy or jurisdiction over the whole church was conferred on St. Peter directly, and not mediately through any delegation authorized by the church as a whole; (2) that this primacy rests by divine institution in the line of Roman pontiffs as St. Peter's successors; (3) that the pope's jurisdiction is immediate in all churches, all other bishops being merely his curates and deputies; so that not only on questions of faith and morals, but on questions of discipline and order the entire church, both priests and laymen, are bound to submit to his authority; (4) that it is unlawful to appeal from the pope to an ecumenical council as a higher authority; (5) that the pope, when he speaks *officially* and defines a doctrine of faith or morals to be held by the universal church, is infallible, and his utterances are not to be modified or changed.

See ROMAN CATHOLIC CHURCH.

Vaudeville (*vōd'vĭl* or *vōd-vēl'*), originally a gay ballad or song for popular entertainment. The name comes from the "van" or valley of the river "Vire" in Normandy, where many popular country songs originated toward the close of the fourteenth century, and became known as vaudeville. The word was originated by Oliver Basselin in the fifteenth century. Authors of comedies began to use these light, joyous songs to break up their plays, and gradually the modern application of the term came into being. Vaudeville to-day is a theatrical entertainment which is either a slight dramatic sketch or pantomime broken by songs and dances, or a series of skits, songs, dances and acrobatic feats having no dramatic connection.

Vaudois (*vō dwä'*). See WALDENSES.

Vaughan (*vôn*), **Herbert**, CARDINAL, a distinguished English Roman Catholic prelate and the successor of Cardinal Manning as Archbishop of Westminster, was born at Gloucester, England, on April 15, 1832. He received his education at Stonyhurst College and at Rome. He was ordained a priest at Lucca in 1854. He returned to England and joined the Oblates of St. Charles at Bayswater. He later became vice-president of St. Edmund's College near Ware, and in 1869 founded and became president of St. Joseph's Foreign Missionary College, Middlesex. Three years later he accompanied a detachment of priests to Maryland on a special mission to the negro people of the United States. In 1872 he was consecrated to the bishopric of Salford, and twenty years later was transferred to the See of Westminster. In 1893 he was created a cardinal of Rome, and two years later he laid the foundation stone of Westminster Cathedral, a vast and stately edifice in the Byzantine style erected in London. When he died on June 19, 1903, the building was so near completion that requiem mass was said there over his body.

Vault (*vôlt*), an arched roof, usually constructed of stone or brickwork. The simplest kind of vault is the semicircular arch extending from one end of an apartment to the other. Ordinary bridges are an example of this style of vaulting, which was commonly used by the Romans, who also built vaults with groins, that is, vaults intersecting one another. The Egyptians are also said to have been acquainted with vaulting; but the earliest remains of ancient vaults of any magnitude are among the Romans. The Roman vaults, when groined, were usually constructed with carefully cut stone, so as to prevent the angle from chipping; but the medieval architects had no costly materials available nor skill of the Romans at command; so they formed only the groins of dressed stone, and filled in the vault with more common material. This led to the groins becoming a prominent feature in medieval architecture, moldings and carvings being used for ornamentation. In modern architecture vaults and arches are gradually being superseded by the use of iron constructions, both for roofs and for supporting floors and bridges.